INDIAN JOURNAL OF PERITONEAL DIALYSIS

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Aims

The purpose of the scholarship is to promote the awareness of peritoneal dialysis by encouraging qualified individuals to extend their knowledge and expertise of peritoneal dialysis by visiting a center of excellence for up to 3 months. The Awards Committee reviews the applications with respect to merit, appropriateness, facility to be visited, the supervising physician at the facility, and geographic distribution of applicants. Preference is given to promotion of peritoneal dialysis in developing countries.

Types and Amounts of Awards

Awards are given for up to $3000 for 2 to 3 months of study. The funds are to be used to support travel and living expenses and for educational expenses during the visit to the host institution.
Awards for shorter stays will be considered if applicants have specific and defined goals and objectives that they would like to pursue as a host institution.

Application Process

Awards are given annually in 2 rounds (May and November).

The deadline for applications are 31 March and 30 September. A completed application letter must be accompanied by a curriculum vitae, a letter of acceptance from the institution to be visited, and a letter from the home institution director / supervisor supporting the application.

Applicants should clearly specify the duration and intent of their visit, future plans after the visit, and the amount of funding requested. Awards are for a maximum of $3000 to support 6 weeks to 3 months of study; shorter stays will be pro-rated accordingly.

Applications should be sent to:

Dr. Wai-Kei Lo
Chair, ISPD Scholarship Committee
c/o Department of Medicine,
Tung Wah Hospital
12 Po Yan Street, Hong Kong
With soft copies sent to wkloc@hkucc.hku.hk

Eligibility

Applications are encouraged from developing countries. ISPD members as well as non-members may apply. From developed countries, only individuals younger than 40 years of age are eligible.

Completion of Study

Each award recipient is expected to submit a brief summary of their experience within 3 months after completion of the visit and how they feel their experience will assist them on their return to their home institution and country. The report should be sent to the Chairman of the ISPD Scholarship Committee.

INDIAN JOURNAL OF PERITONEAL DIALYSIS

Editors Note:

Indian Journal of Peritoneal Dialysis is a publication dedicated to peritoneal dialysis. The journal welcomes original contributions dealing with all aspects of peritoneal dialysis from scientists involved in peritoneal dialysis around the world.

The Indian Journal of Peritoneal Dialysis will publish original contributions, review articles, editorials, short communications, case reports, peritoneal dialysis literature and book reviews.

I have great pleasure in congratulating Dr. Narayan Prasad the secretary of the Peritoneal dialysis society of India for being awarded Muthoot M George Tanker foundation and Kerala kidney research foundation award for the best investigator in Nephrology in India for his work on Genetics and glomerulonephritis. The award carried Rs. 1,00,000 gold medallion and a citation which was presented to Dr. Narayan Prasad at a ceremony which was held in Chennai on 25th January 2010.

Dr. AK Bhalla the past secretary of the PDSI was awarded Padmashree 2010 by the president of India. I take this opportunity to congratulate Dr. AK Bhalla.

Dr. Rajan Ravichandran was unanimously chosen as the president-elect of the peritoneal dialysis society of India.

Georgi Abraham
Editor-in-Chief

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ISPD ASIAN CHAPTER SCHOLARSHIPS

Aims

The purpose of these awards is to promote PD awareness, knowledge and expertise by visiting a centre of excellence for 2-3 months. It is intended primarily for nephrologists and renal nurses in Asia especially in the developing countries*.

Application Process

There will be 2 rounds per year. The deadlines for applications are 30th June and 31st December respectively. A completed application form with along with curriculum vitae, a recommendation letter from the director of the nephrology unit or department, and a letter of acceptance from the institution to be visited, should be submitted to the Chair of the Committee. A letter of support from the administrator of the applicant's institution is advisable.

Amount for the Award

The award funds are to be used to support travel and living expenses during the visit and/or to support the learning process during the visit, covering an economic round-trip airfare and living allowance to a maximum US$1,000 per month depending on the living standard of the training center city. The total maximum per individual cannot exceed US$3,000. Financial breakdowns with supportive evidence is required for award amount approval. Notification of the Committee's decision will be made by the Chair of the committee within three months of close of application. Cheques will be sent to the Director of the accepting center after arrival or otherwise specially arranged.

Duration of Visit

The applicant shall spend at least 6 weeks at the training site. There is no partial award to support visits of less than 6 weeks. The applicant should commence the visit within 6 months after notification of the award. Candidates may extend the training period beyond 3 months at their own cost. Postponement of commencement date without prior approval would lead to loss of the scholarship.

Eligibility

Applicants must have to be an ISPD member including MD, trainee, nurse or institutional member. There is no age restriction. Excluded from eligibility are employees of industry. There has to be a center in Asia or Australia / Oceania with more than 75 home PD patients and has been established for not less than 5 years. Priority will be given to clinical training. A list of available, but a not exclusive, training center is available for contact.

Deadline for Application: 30th June or 31st December each year

*Developing countries refer to those countries eligible for ISPD institutional membership.

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Presidential Dialysis in India Present Challenges

Dr. Arup Ratan Dutta
Chief Nephrologist, Wockhardt Hospital & Kidney Institute,Kolkata

Welcome to Goa for the 12th Annual Conference of the Peritoneal Dialysis Society of India. Goa, it is said, is a state of the mind. Those of you who have come here to attend this conference also have this unique state of mind that you believe in peritoneal dialysis.

At the outset let me tell you that we have arrived at a point where the rapid growth of PD that we witnessed in the last decade is showing signs of slowing down and rather than ignoring this early trend or being too overwhelmed we will view this with cautious optimism and try to find some answers. It is therefore important at this point that we look back on how PD has evolved over the last 2 decades and analyze the problems and challenges that lie in front of us.

Although intermittent and acute peritoneal dialysis has been practiced for over forty years in India, this modality remained unutilized as chronic therapy because of lack of equipment and expertise. The first patient was put on CAPD in 1991 in Chennai by Dr. G. Abraham, who had just returned from Canada after having trained under Prof. D.G. Oreopoulos. Subsequently other centers started their own programs and by 1993 there were 6 hospitals practicing PD the most notable ones being SGPGI, Lucknow under Dr. A. Gupta and Apollo Hospital Chennai under Dr. K.C. Prakash.

The equipment available at that time was primarily the reusable 'O' set and 'Y' set. The 'O' set needed a disinfectant after every exchanges adding to the complexity of the exchange procedure and the risk of chemical peritonitis and was quite problematic. The 'Twin bag' which is the standard or care at the present time was extremely expensive and not routinely available.

PD started evolving slowly more as therapy for the old and the rich. The quality of Hemodialysis in the early nineties was not good mainly due to unavailability of treated water and the machines utilized Acetate dialysate and did not have volumetric ultrafiltration. This was hemodynamically stressful particularly for elderly patients with cardiovascular diseases and those who could afford shifted to PD which was about 2- 3 times more costly than HD at that time.

Gradually the benefit of PD started being apparent and more centers started all across the country. By 2001, there was more than 1600 patient on PD and by 2005, this number rose to 5100. Baxter was the major suppliers of fluid along with Claris, Gambro, Fresenius and J. Mitra. Baxter, Claris and J.Mitra had started manufacturing of fluid in India[1].

The Changing Global scenario

During the period 1995- 2005, when PD evolved and had a reasonable growth in India, the global scenario was changing. PD usage was decreasing everywhere including the public provider countries like UK, Canada which had traditionally a higher proportion of patients on peritoneal dialysis [2].

Generally PD is utilized more by countries where the Government provides dialysis whereas HD is much more prevalent in countries with privatized dialysis.

PD utilization in Canada dropped from 32 % in 1996 to 19% in 2005 and in UK it dropped from 34% in 1999 to 23 % in 2005[2].

There can be many reasons for this; the principal one cited being the large scale proliferation of HD units. Once the investment is made it is 'logical' to utilize the capacity fully and thus most patients are put on HD without a full discussion about all other options [2].

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A similar trend is observed in India. Haemodialysis capacity has increased exponentially and with the availability of low cost facilities more patients are being treated by HD. The impact is clearly reflected in the numbers of prevalent PD patients. Between the years 2002 -2006, the number of PD patients was growing by about 1000 each year and in 2006 there were 6100 patients. In 2007 & 2008, the numbers were 6600 and 7100 respectively indicating a growth of about 500 patients each year which is clearly less than before.

The two main reasons for this seem to be high dropout rate and underutilization.

Why PD is underutilized in India

The current penetration of PD in India is 17 %. Although this appears to be comparable to neighboring countries like Singapore (19.6%) or Korea (22.5%), it falls short of the projected number of 30% which is generally regarded as a reasonable goal.

Worldwide practices show that in many countries the share of PD as a dialysis therapy is close to, around or exceeds 30%. Surveys show that over 30 - 50% of informed patients suitable for either treatment would choose PD as the first modality. Studies have shown the Nephrologists recommend a PD proportion of 30 % or more. Also, recent policy regional policy initiatives set in Ontario in Canada and Queensland in Australia aims to increase the share of PD in the treatment mix to 30% or more [3].

Before we analyze why PD penetration is less than HD, there are some practical limitations of PD that we must understand and accept. HD is dependent on HD at the time of initiation unless it is early start which is rare in our country. PD is dependent upon HD at the time of complications like fluid overload, mechanical problems and peritonitis. Also, there is far more permanent PD to HD transfers than of HD to PD. Having said that, I strongly believe that a proportion of our patients do extremely well on PD with unique flexibility and good quality of life that is unmatched by anything other than a functioning transplant. Unfortunately this subset of patients is not being identified or being offered the option of peritoneal dialysis.

Obviously there are reasons behind this underutilization. A recent survey undertaken in India, Srilanka, Bangladesh, Pakistan and Nepal by G. Abraham et al [4] cited lack of CKD education as the primary cause along with physician issues like decreased reimbursement and limited training in PD. A simple look into our own practices will make another point clear. Most of the centres do not have adequate paramedical staff and infrastructure or a CKD clinic where the treatment options can be discussed in detail and most Nephrologists are simply too busy to do this during a routine consultation. As a result a large number of our patients are simply unaware of PD as a modality (and its advantages and disadvantages) and they are put on HD more as a 'default' mode.

The business model of PD delivery at this time is faulty. The start up is definitely more costly than HD and the maintenance cost is generally higher with the wide spread availability HD. Also there is an incremental cost with time as patients need to be treated with higher volumes when residual renal function is eventually lost.

I think the previous practice trends are also responsible to some extent. The choice of PD has more often been a negative selection as we have tended to put the sicker patient with multiple co morbidities on PD. We have really not attempted to put our 'good' patients on PD. This negative selection and association with a sick patient and poor survival perhaps send a wrong message to the society.

Availability of Nephrologists and PD usage

India has 800 Nephrologists for a population over 1 billion. This works out to a ratio of 0.8/ million, whereas the standard ratio in developed countries is about 20 nephrologists for million. Out of the 800 Nephrologist, most are settled in major cities. There is a significant disparity in the distribution of nephrologists statewide- Kerala has 1.8 Nephrologist/ million whereas in Uttar Pradesh the number is 0.1/ million. In the Northeast there are only 1-2 centers for 5 states.

Nephrology service can only begin with a Nephrologist and development of infrastructure follows. In areas with less number of specialist and HD infrastructures, PD has a higher penetration as it is the natural choice.

This presents a good opportunity of studying the outcome of patients with a case mix somewhat similar with countries with a 'PD first' policy.

Prasad et al from SGPGI, Lucknow reported patient survival of 90% at 1 year and 39% at 5 yrs and technique survival of 98% at 1 yr and 75% at 5 yrs. These results are extremely encouraging and show that dropout rate can be low if we select right kind of patients [5].

Most of our good patients are treated by HD for various reasons. It is logical to assume that results will be comparable on PD if the case mix is similar.

What can we do to reverse the trend and increase PD penetration?

There are 50 training institutions in India. However, the exposure to PD is not uniform. This is quite similar to the Western world where a Nephrology trainee may complete his training without seeing 5 PD patients or an episode of peritonitis. It is important that young Nephrologists proper PD training so that they are not hesitant to offer this treatment to a suitable patient when they are in practice. PDSI in association with the industry has organized workshops in different localities aimed towards trainees and this practice should continue.

The Industry has taken steps in the past to facilitate the delivery. 'Lifetime scheme' and insurance coverage for peritonitis related treatment are innovative ventures and have been quite successful. However, the disparity of cost still exists particularly with the availability of low cost HD and this need to be addressed.

The other major hurdle is the way PD is looked upon by the Hospitals. There is a reluctance to provide space and dedicated personnel as PD is not viewed to be profitable. Rather than calculating return on investments of individual items the healthcare Industry should view PD as an essential component of renal care.

Perhaps the most important factor that hinders the growth of PD today is the lack of insurance coverage for domiciliary chronic therapy. It is ironic that insurance companies extend coverage for complications like peritonitis without covering for the treatment itself. It is thus not at all uncommon today to see patients who choose PD as primary therapy but eventually opt for HD only because there is insurance coverage for the latter. Certainly this matter needs to be dealt as a priority.

The future of PD in India

It appears that PD penetration in India at this time has stabilized around 15-17% as per industry estimates. While the generally projected goal is 30% as discussed earlier, 25% seems to be a reasonable and more realistic goal. To achieve this following must be ensured. Firstly, PD training must be adequate and uniform across the country so that young nephrologists are confident in prescribing this therapy. Secondly there should be less cost disparity between HD and PD and comparable insurance cover so that there is a level playing field.

We can speculate that once there is a critical mass of relatively fit patients who are put on PD on the basis of a positive selection the benefits of this therapy namely flexibility, preservation of residual renal function and superior survival in the initial years will be more visible to patients and the public.

References:

1. Abraham et al, Chronic peritoneal dialysis in South Asia-Challenges and future. Peritoneal Dialysis Inter 2008; 28 : 13 -19
2. Blake P, Proliferation of Hemodialysis Units and Declining Peritoneal Dialysis Use: An International Trend. American Journal of Kidney diseases 2009; 54: 194-196
3. Narayan Prasad & Girish Sawhney, ISPD Asian Chapter Newsletter 2009
4. Abraham et al, How to make peritoneal dialysis affordable in developing countries: Contrib Nephrol 2009; 163: 243 -249
5. Prasad et al J Am Soc Nephrol 2006; 17 : 271A

Percutaneous CAPD catheter insertion by nephrologist- A single centre experience over 4 years.

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Abstract: **Over a 4 year period from 2006 to 2010, 96 peritoneal dialysis catheters were inserted using the percutaneous seldinger technique for initiation of CAPD in our unit by the same nephrologist. There were 62 males and 34 females. The mean age was 53± 13 years . Children and those with high probability of intraabdominal peritoneal adhesions due to previous surgeries were excluded. The procedure had to be converted to open surgical placement in 8 cases due to unsatisfactory catheter positioning. There were 4 serious complications (3 Intestinal injuries and 1 bladder injury) . Four instances of exit site leak were seen which resolved spontaneously. Patients were in the hospital for a mean period of 8 ± 3 days in the post operative period. Compared to 19 catheters inserted primarily by open surgical technique in the same period the following differences were noted. The incision size and post operative pain was less in the percutaneous insertion group. The break in period was earlier (4± 1 day Vs 10 ± 3 days)in the percutaneous group. They were discharged earlier with considerable reduction in the hospital expenditure.Thus this procedure has many advantages over the surgical method and should be taken up by more number of Nephrologists across India.**

Keywords: **Continuous ambulatory peritoneal dialysis, interventional nephrologist, percutaneous insertion, peritoneal dialysis catheter.**

Introduction

In recent years a new and aggressive branch of Nephrology called the Interventional Nephrology is rapidly growing whose intention is to take positive control of myriad radiological and surgical procedures done on CKD patients. The care of chronic kidney patients involves diagnostic and interventional radiological procedures such as diagnostic renal ultrasonography, ultrasound-guided kidney biopsies, placement of tunneled hemodialysis or peritoneal catheters, sonological or radiological investigation of vascular access dysfunction. Presently most of these procedures are performed by radiologists,vascular surgeons and surgeons. Such inherently busy non - nephrology specialities focus less than optimum attention on CKD patients which frequently leads to delays in starting life saving procedures and interventions. Percutaneous peritoneal Dialysis Catheter (PDC) placement if performed by the nephrologist, can provide a quick, safe and reliable peritoneal access with significant cost benefits. With this objective in mind we set out to perform nephrologist initiated placement as the primary mode of catheter positioning in our patients over the last 4 year period.

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Materials and Methods

We retrospectively studied 96 patients over a four years period from January 2006 to February 2010 in whom CAPD was initiated at our center. Data regarding the demography, etiology,procedure,complications and fiscal considerations were collected. We excluded pediatric age group from our procedure since we felt that omentectomy was required through open surgical access . Also excluded were those patients with previous laparotomy in whom it was felt that post operative adhesions in the omentum were likely. We used double-cuffed Tenckhoff catheters with straight tips (Quinton

Instrument Company, Seattle, WA, USA). All the percutaneous catheter insertions were performed by a single nephrologist and the surgeon was kept on stand by.

Procedure of percutaneous catheter insertion

After a preoperative bowel cleansing enema and starvation for 6 hours these patients were administered intravenous Vancomycin (1g) one hour prior to the procedure.On the table the urinary bladder was catheterized. Patients received intravenous fentanyl (1microgram/kg) or propofol (1mg/kg) and liberal local anesthesia (2% lignocaine)at the chosen site of catheter insertion. A horizontal paramedian incision, 2-3 cm long was made, followed by blunt dissection of subcutaneous tissue until the fascia of the rectus muscle was reached. The peritoneum was carefully punctured using a16-gauge needle from the Quinton-catheter placement kit. The final position of the needle was ascertained to be inside the peritoneal cavity by injection of radiocontrast agent. Correct position of the needle is indicated by the dye outlining the bowel before collecting at the pelvic fossa. On the other hand, Incorrect position of the needle in the pre peritoneal space is indicated by the localized collection of dye as a pool around the needle.After ascertaining the correct position , a guide wire was introduced by seldinger technique through the needle.The position of the guide wire was confirmed with fluoroscopy using image intensifier. A peel away sheath and introducer were inserted over the guide wire. The introducer was removed along with the guide wire leaving the peel away sheath in situ.The PDC was advanced through the peel away sheath and directed caudally toward the left iliac fossa thus splitting the peel away sheath. The position the PDC was reconfirmed with fluoroscopy to ensure its positioning in the pelvis. The inner cuff of the PDC was secured by a suture on the fascia of the rectus abdominis. An 8-12 cm percutaneous tunnel for the PDC was fashioned and the proximal end of the PDC was pulled through the exit site and positioned in a manner that the second cuff is 2 cm away from the exit site. The original incision was then closed and the PDC flushed with 2L of heparinized 2.5% dialysis solution to confirm catheter patency and to ascertain free drainage. CAPD was initiated 3-5 days after PDC placement. Patient training was performed during this period. Low volume supine exchanges (up to 500 ml) were periodically performed during the training, the patients were instructed to avoid constipation. The results are summarized in table 1 .

Table 1 - Data on Percutaneous insertion of CAPD

Total Number	96
Male : Female	62:34
Mean age yrs	53±13
Repositioning by surgery	8
Complications Needle stick injury to Bowel Bladder injury	8 3 1
Peri catheter leak Break in period	4 4±1days
Hospitalisation	8±2days
Follow up	14±8 months/patient

Discussion

The present experience suggests that percutaneous insertion of PDCs is a dependable peritoneal access technique, and can be compared favorably with surgical techniques in terms of catheter –related mechanical complications. This strategy has the added advantages of early initiation of exchanges and reduced expenditure.

We have earlier published our initial data which compared the percutaneous insertion with that of surgical placement .[1] The present article describes the experience over a 4 years period with a much larger patient base. It has been shown convincingly that Catheter insertion by nephrologists has far reaching implications in the form of heightened penetration rates of CAPD across the individual centres . Initiation of catheter insertion by nephrologists in three centres in the United States was associated with a 22–32% increase in the number of peritoneal dialysis patients.[2,3,4] The build up of support systems in the form of Interventional Nephrology suites in the Nephrology wing is proving to be helpful for early insertion of PDC without waiting for the Operation Theatre vacancy. In particular, a universal policy of catheter insertion by nephrologists in one Malaysian dialysis unit was associated with a dramatically increased penetration ratio of

peritoneal dialysis compared to haemodialysis, representing a 4 fold increase from that of the national average .[5]

Recently,Oktay Banli et al from Turkey have published their initial experience with this technique. Percutaneous bed side placement of PDCs by nephrologists has been demonstrated to be a safe and reliable. 42 double-cuff Tenckhoff CAPD catheters were inserted into 41 patients. Percutaneous technique was used and PD was started on the sixth day. Only 2 pericatheter leakages (4.8%) were detected. This procedure is comparatively safe, simple, and less costly than surgical and peritoneoscopic placement.[6] The rate of early pericatheter leakage may be lowered with this technique and PD may be started earlier. In all our patients we have inserted the catheters in aseptic theatres and the procedure is carried out as the first case in the morning.

Scott Henderson et., have published a large series in the previous year in which 283 catheters were inserted percutaneously using Seldinger technique under sedation and local anaesthesia. [7] No major complications occurred. In 7% of the percutaneous patients and 5% surgical patients, the procedure failed or was abandoned. Poor initial drainage occurred in 21% insertions but resolved in most cases and resolved dialysate leak in 6%. Wound infections or peritonitis occurred in 9% and 4% of percutaneous insertions. Only 13% of patients could not use their catheter at 1 month after percutaneous insertion, and 83% of the patients remained on PD using the original catheter at 6 months.

There were 8 conversions to open surgical procedure in our series .The chief reason being unsatisfactory initial catheter placement in the pelvic fossa. A new laparoscopic technique using an extra peritoneal approach with omentopexy for PDC placement has proved to be extremely useful for preventing catheter malfunction caused by catheter tip migration, pericatheter leakage, omental wrapping and periodic catheter movement that causes abdominal pain in CAPD. Thirty-one catheters were placed laparoscopically. The mean operating time was 52 minutes. Adhesiolysis was required in 9 (29%) and omentectomy or omentopexy in 3 (10%) cases. Late complications included catheter dysfunction in 2 patients (6.5%), debilitating abdominal pain requiring catheter removal in 1 patient, and 1 trocar-site hernia. The mean follow-up was 17 months.[8] However , use of laparoscopy mandates general anesthesia and is associated with increased expenditure.

Although percutaneous insertion has been reported to be safe, previous reports have showed a high incidence of leakages and early mechanical complications and the potential risk of bowel perforation since this technique is a 'blind' procedure with out direct visualization of the peritoneum.[9] Needle stick injury to the bowel is the main complication which can lead to serious consequences if recognized late. If suspected the needle should be withdrawn and patient closely watched and given complete bowel rest for 24 – 48 hours. In one patient the injury proved fatal as it was not recognized and the catheter was placed through the transverse colon. The injury was recognized only when exchanges were started 3 days later. Rapid onset of peritonitis proved fatal inspite of surgical intervention . A case of bladder injury was recognized on the 7th day when exchanges were started . The injury was repaired by surgical procedure.

To prevent injury to viscera during the needle stick we feel that use of Veress needle as done for laparospcopy will be a good alternative. The Swiss Association for Laparoscopic and Thoracoscopic Surgery (SALTS) prospectively collected the data on 14,243 patients undergoing various standard laparoscopic procedures. This database was investigated with special regard to intraabdominal complications caused by trocars and Veress needles. There were 22 trocar and four needle injuries (incidence, 0.18%). Nineteen lesions involved visceral organs; the remaining seven were vessel injuries. The small bowel was the single most affected organ (six cases), followed by the large bowel and the liver (three cases each). Diagnoses of two small bowel and one bladder injuries were made postoperatively. Needle injuries were all diagnosed intraoperatively. Only five injuries could be repaired laparoscopically; the remaining lesions were repaired openly. Four patients underwent an open reoperation, and another patient needed five reoperations. There was one death (4.0%). Trocar and needle injuries are rare complications. If not recognized intraoperatively and repaired immediately, they induce increased morbidity and mortality.[10]

Based on the literature survey, we placed percutaneous PDCs using local anesthesia supplemented with intravenous (IV) analgesia with fluoroscopic guidance. The break in period was shorter than conventional two week period. In our study, early leakage was observed in 4% of the percutaneously inserted catheters. All these resolved after a waiting period of one week before resuming the cycles. Reports regarding leakage from surgical study vary between 0.9% and 8.6%. A low incidence of leakage in our percutaneous group was probably due to the lateral placement of the inner cuff and the appropriate fixation in the rectus muscle using a paramedian incision.

Catheter related malfunction causing drainage failure may arise following the catheter or migration of the catheter tip from the pelvis in to the upper abdomen. Although it has been argued that surgical catheter placement is preferable to percutaneous placement because of the direct visualization during positioning, several studies have shown that there is no advantages of surgical placement with regard to catheter related malfunction.[9] Our data supports this view, with only one preperitonial placement in the percutaneous implantation group.

Compared to 19 catheters inserted primarily by open surgical technique in the same period the following differences were noted. The incision size was 3.5cm in the percutaneous group, while that in the surgical group was significantly larger at 5.5 cm. The break in period was earlier (4$\pm$ 1 day Vs 10 $\pm$ 3 days)in the percutaneous group.They were discharged earlier with considerable reduction in the hospital expenditure. Cost analysis revealed a significant advantage with the percutaneous insertion of PDC. The average expense to the patients in the percutaneous group was INR 35,000 while that to the patients in surgical group was significantly higher at INR 50,000.The convenience of the procedure,early initiation of dialysis and cost savings are ideal for patients in developing countries such as India since patients come to nephrologists notice quite late and have limited financial resources.

Conclusions

In our experience over 4 years, insertion of the PDC percutaneously by a nephrologist is safe, cost effective and ensures early initiation of CAPD exchanges. The benefits of improving the CAPD penetration by this intervention is real and should be pursued with zeal by Indian nephrologists . More workshops and live demos should be conducted to popularize this across the country.

References

1. K.Sampathkumar, A.R.Mahaldar,Y.S.Sooraj et al: Percutaneous CAPD catheter insertion by a nephrologist versus surgical placement: A comparative study.Indian journal of Nephrology. Jan 2008; 5- 12.
2. Asif A, Pflederer TA, Vieira CF, et al. Does catheter insertion by nephrologists improve peritoneal dialysis utilization? A multicenter analysis. Semin Dial 2005; 18:157–160.
3. Asif A, Byers P, Gadallah F, et al. Peritoneal dialysis underutilization: the impact of an interventional nephrology peritoneal dialysis access program. Semin Dial 2003; 16:266–271.
4. Gadallah MF, Ramdeen G, Torres-Rivera C, et al. Changing the trend: a prospective study on factors contributing to the growth rate of peritoneal dialysis programs. Adv Perit Dial 2001; 17:122–126.
5. Goh BL, Ganeshadeva YM, Chew SE, et al. Does peritoneal dialysis catheter insertion by interventional nephrologists enhance peritoneal dialysis penetration? Semin Dial 2008; 21:561–566.
6. Oktay Banli, Hasan Altun, and Aysegul Oztemel. Early start of CAPD with the seldinger technique.Peritoneal Dialysis International, Vol. 25, pp. 556–559.
7. Scott Henderson, Edwina Brown and Jeremy Levy Nephrology Dialysis Transplantation 2009; 24(11):3499-3504.
8. Haggerty SP, Zeni TM, Carder M, Frantzides CT. Laparoscopic peritoneal dialysis catheter insertion using a Quinton percutaneous insertion kit.JSLS. 2007 Apr-Jun;11(2):208-14.
9. Philip Kam-tao Li and Kai Ming Chow : Importance of peritoneal dialysis catheter insertion by nephrologists: practice makes perfect; Nephrology Dialysis Transplantation 2009; 24(11):3274-3276.
10. M. Schafer, M. Lauper, L. Krahenbiltil. Trocar and Veress needle injuries during laparoscopy.Surg Endosc 2001; 15: 275-280.

Peritoneal Dialysis and Renal Transplantion

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Abstract: **Peritoneal dialysis is one of the integrated therapies for patients waiting for renal transplantation. Many study shows the occurrence of delayed graft function is lower in CAPD patients than in hemodialysis patients. Peritoneal dialysis modality plays an imperative role on their pre-transplant, perioperative and post transplant management of chronic kidney disease patients. Acute allograft rejection incidence is similar in peritoneal dialysis patients and hemodialysis patients.**

Key words: **Peritoneal dialysis, renal transplantation, hemodialysis, peritonitis**

Introduction:

With the increasing use of peritoneal dialysis (PD) as a modality of renal replacement, a significant 'pool' a patients on PD are now receiving a renal allograft or are in the waiting list for renal transplantation.

Recent data (USRDS 2000) suggest that 66.5% of incident PD patients in the year 1998 were less than 65 years of age. Combined with a better 2 year survival [1, 2] and an equivalent 5 years survival [3] it is anticipated that this 'pool' of patients who will be receiving a renal transplant will increase in the years to come. In one centre in Europe retrospective analysis of their dialysis data show that a larger percentage of their PD patients received an allograft compared to their HD counterpart[4]. These PD patients besides having the problems of end stage renal disease on dialysis have certain characteristics that are unique to them. These issues pertaining to their modality of dialysis often impact on the management of their peri-transplant period and its subsequent outcome.

Pre-transpalant Management : Peritoneal dialysis patients awating a renal transplant are managed almost similarly to that of patients on hemodialysis (HD). However in certain areas, management differs and it is important that nephrologists managing these patients understand these situations and their management.

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a) Cardiovascular co-morbidity: Previously, PD patients often had worse cardiovascular function than HD patients. Infact, patients were often shifted from HD to PD because of the improvement in cardiac function[5]. Since PD has been shown to decrease left ventricular (LV) volume and improve LV systolic function in patients with LV enlargement and systolic dysfunction [6]. On the other hand PD is believed to adversely affect the lipid profile of these patients[7] thereby potentially worsening atherogenic risk profiles. As far for all patients, a pre transplant work up complete cardiovascular evaluation needs to be done and corrective measures offered when indicated. Coronary artery bypass surgery can be performed safely & effectively in PD patients [6].

b) Hypertention and fluid overload status: Many studies have shown that systolic blood pressure control is better in PD patients than HD patients [8]. However it is important to know that poor hypertension control is PD patients is positively correlated with volume overload, dialysate/plasma Creatinine and negatively with serum albumin[9]. The close interlinking of hypertension, hypervolemia, transporter status and nutrition in PD patients warrants a through assessment and risk stratification pre transplant. Many nephrologists will prefer their patients to be mildly volume overloaded, if tolerated, as certain studies have shown that volume contraction that may be present post dialysis, may predispose to delayed graft function [10].

c) Anemia, blood transfusion and presensitization: Even before recombinant erythropoietin was available, anemia was better controlled with PD for various reasons . PD patients maintained an average hematocrit of 29.4% compared to HD

patients who had an average hematocrit of 24.3% [11] (Table 1). This better control of anemia leads to a lesser requirement of blood transfusion and consequently presensitization.This may be one of the reasons why PD patients have a shorter waiting period to transplantation [12].

d) Residual renal function: Peritoneal dialysis preserves residual renal function better because of its continuous nature in patients on CAPD and presumably because fluid shifts are less dramatic [13]. Studies have shown that preservation of residual renal function not only improves survival but may also have a positive impact on immediate post transplant graft function [12, 14]. Hence all efforts should be made to preserve residual renal function in PD patients awaiting renal transplant[14].

e) Immune Status: Some studies have suggested that uremic patients, on peritoneal dialysis have a immune function[15,16]. This may be responsible for the increase in acute rejection episodes that has been shown in some studies [17].

Table I

Anemia in PD patients

Improvement of anemia in PD patients.

1. Better clearance of middle molecules [39].
   Removal of toxins that inhibit hemoglobin synthesis / EPO production.
2. Reduced hemolysis.
3. Better preservation of residual renal function.
4. More physiological biocompatibility of the technique.
5. Low mechanical damage to red cells.
6. Less blood loss, less iron requirement [40].

f) Infections: PD patients who have an acute peritonitis episode should have their transplant deferred by 4-6 weeks after appropriate therapy of the infection[18] . If the patient has an exit side infection the catheter is removed pre transplant[18] at time of transplant. Peripancreatic abscess formation is an important cause of surgical morbidity in simultaneous pancreas kidney transplantation and has been found to be more common in PD patients[19]. Optimally, current consensus is to preserve the catheter till the post transplant period in these patients[20]. Optimally, patients undergoing a simultaneously pancreas kidney transplant should have a PD catheter placed in such a manner that the exit site is medial [20].

Perioperative Catheter Management

The abdomen is drained and the catheter is clamped pre transplant. If the kidney is very likely to function immediately post transplant, such as is the case if a living donor organ is used, many surgeons will remove the catheter during the transplant procedure. If there is a significant change of delayed graft function, the peritoneal catheter is maintained in situ during the transplant surgery. The catheter is clamped pre transplant and usually no routine flushing is undertaken post operatively. The only reason to flush the catheter is to study the effluent if the patient develops abdominal pain and pyrexia. Exit site care is as usual in the post transplant period [18]. The catheter may be used post transplant if dialysis is required providing the kidney was implanted extraperitoneally with no rupture of the peritoneum.

Post Operative Management

The abdomen is drained and the catheter is clamped pre transplant. If the kidney is very likely to function immediately post transplant, such as is the case if a living donor organ is used, many surgeons will remove the catheter during the transplant procedure. If there is a significant chance of delayed graft function the peritoneal catheter is maintained in –situ during the transplant surgery and usually no routine flushing is undertaken post operatively. The only reason to flush the catheter is to study the effluent if the patient develops abdominal pain and pyrexia. Exit site care is as usual in the post transplant period.

a) Delayed Graft Function: Many papers have reported reduced incidence of delayed graft function in patients in patients on PD. Cacciarelli et al [21] on a retrospective analysis, have shown a trend towards a decreased incidence of dialysis dependence in the early post transplant period in PD patients receiving deceased donor transplants. In another study immediate graft function was seen in 68.5% patients who were on PD pre transplant compared to 46.5% in those on HD [22]. This beneficial effect of PD on immediate graft function has been replicated in various case control studies.

Analyzing the data from the United Network of Organ Sharing, Bleyer et al [12] compared the immediate post transplant outcome of all cadaveric graft recipients between April 1994 and December 1995. In their analysis the odds of oliguria in the first 24 hours were 1.49 (1.28-1.74) times higher in HD versus PD patients. The postulated reasons for the beneficial effect of PD is in lower likelihood of volume contraction in PD

patients pre transplant, though other studies have shown that the protective effect is independent of fluid status [23]. Preservation of residual renal function in PD may also confer some protection. Difference in the immune function [12] and cylokine production may also explain the difference in the behaviour of the ischaemic kidney. Despite earlier poorer results [17] a recent study has shown that 5 year graft survival is similar in patients on both PD & HD. [24]

b) Renal Vascular Thrombosis (RVT): Retrospective studies have shown that renal vascular thrombosis post transplantation is more frequent in PD patients [25, 26]. This finding is consistent with an acquired thrombophilic state described in PD patients ***Table 2***. [25, 26].

Table II

Acquired thrombophilic state in PD patients

1. Hemostatic abnormalities
   Higher concentration of apolipoprotein(a) Apo la (thrombogenic plasminogen-like moiety of lipoprotein(a)[41.]
   Higher procoagulant activities of factor II, VII, VIII, IX, X, XI, XII [42].
2. Drugs
   No administration for of heparin as in HD during dialysis, release of tissue type plasminogen activator drug HD [43].
3. Hemoconcentration [44].
4. Hypoalbuminemia.
5. Higher proportion of patients with cardiovascular morbidity (especially patients who have switched modality), poor blood vessels [45].
6. Higher proportion of patients with diabetes mellitus – atherosclerotic blood vessels.

The risk is highest in patients who have switched from HD to PD before transplantation. Excess risk of RVT in patients who switched from HD to PD was probably due to the underlying clotting disorders in these patients which was initially responsible for the modality switch [27].

In contrast, PD was not an independent risk factor for RVT in an observational, retrospective cohort study by Perez Fontan et al [28]. The incidence of RVT was similar in PD (4.7%) and HD (6.1%) patients. Logistic regression analysis demonstrated that protracted cold ischemia, delayed graft function, presenitization, extremes of age of the donor and use of the right kidney were the independent predictors of RVT in this study. A similar incidence of graft thrombosis in PD & HD patients has also been reported by Bakir et al [29].Even though there is some concern about the hypercoagulable state in PD studies have not been able to implicate it as an important factor for graft thrombosis.

c) Peritonitis and other infections: Infections post transplant are more common in patients who were on PD. The incidence of post transplant peritonitis has been reported to vary between 0-22% [30]. Most of the infections are related to the peritoneal catheter and are caused by organisms that colonize the human skin. The treatment of peritonitis is similar to the ISPD recommendations [18]. Rapid flushing is used if abdominal pain is severe and a very low threshold is maintained for catheter removal in these patients, especially if the transplanted kidney is functioning. Catheter infections in children are more common. 43% develop catheter infection within 2 weeks of discharge.[31] In contrast, exit site infections are not common in the post transplant period with a reported incidence of (2.4%) [30].

Peripancreatic abscess formation is more frequent in PD patients undergoing simultaneously pancreas kidney (SPK) transplant[19]. The most common organism cultured is Staphylococcus epidermidis. In a large single centre study of SPK transplants, it was found that mortality was higher in patients who developed peripancreatic abscesses. However dialysis modality did not impact on the final patient & graft outcome [32].

Bacteremia in the first month post transplant was higher in HD patients. A positive blood culture was more likely in HD patients who have had an acute rejection[33]. The mortality among these patients was more within 2 months of follow up.

Management of PD Catheter Post Transplantation

Peritoneal dialysis catheter can be maintained in the immediate post transplant period. Studies have shown that peritoneal dialysis can be performed effectively post transplant in cases of delayed graft function. Peritonitis rates are high: however infection control is often achieved with antibiotics [34]. Some of the other complications observed are peritoneal leaks and post transplant ascitis. Earlier studies used to advocate removal of the catheter 3 months post transplant if adequate renal function is established post transplant [18]. Currently, centres recommend PD catheter removal at the time of transplant [35].In children PD catheters have been successfully used in delayed graft

function. It is recommended that the catheter be removed at the time of discharge in pediatric renal allograft recipients.[36]

PD After Failed Renal Transplantation

Many patients with allograft failure elect to receive PD as their modality of dialysis. Access problems often make PD a necessary option. Peritoneal membranes function well post transplant as has demonstrated in peritoneal equilibration test studies [37]. No difference in survival in this cohort was noticed vis-à-vis patients with failed grafts who are on HD? These patients are younger and have a more rapid loss of residual renal function. Co-morbidity is the major determinant of survival [38].

Conclusion

Patients on peritoneal dialysis have similar post transplant survival as patients on hemodialysis. The peritoneal catheter can be kept & used if necessary in the peritransplant period. All centers which perform renal transplant surgery in PD patients should be aware of the specific issues particular to these patients.

Reference

1. Burton PR, Walls J. Selection – adjusted comparison of life expectancy of patients on continuous ambulatory peritoneal dialysis, hemodialysis and renal transplantation. Lancet 1987; 1: 1115-9.
2. Schaubel DE, Morrison HI, Fenton SSA. Comparing mortality rates on CAPD/CCPD and hemodialysis. The Canadian experience: fact or fiction? Perit Dial Int 1998; 18:478-84.
3. US Renal Data System: Excerpts from the USRDS 2000 Annual Data Report: Atlas of end stage renal disease in the United States. Am J Kidney Dis 2000;36 (Suppl 2) S1 – S238.
4. Biesen MV, Vanholder RC, Veys N, Dhondt A, Lamiere NH. An evaluation of an integrative care approach for end stage renal disease patients. J Am Soc Nephrol 2000; 11:116-25.
5. Wizmann V, Timio M, Alpert MA, Kramer W. Options in dialysis therapy: Significance of cardiovascular finding. Kidney Int 1993; 40 Suppl S85-91.
6. Alpert MA, Hunting J, Twardowski ZJ, Khanna R Nolph KD. Continuous ambulatory peritoneal dialysis and the heart. Perit Dial Int 1995; 15: 6-11.
7. Prichard SS. Impact of dyslipidemia in end stage renal disease. J Am Soc Nephrol 2003; 14: S 315 – S20.
8. Dasgupta I, Burden R. Blood Pressure control before and after starting dialysis. Nephron Clin Pract 2005; 99(3) : 86-91.
9. Wong PN, Mak SK, Lo KY, Tong GMW, Wong AKM. Factors associated with poorly controlled hypertension in continuous ambulatory peritoneal dialysis patient. Singapore Med J 2004; 4(11): 520-4.
10. Issad B, Mouquent C, Bitker MO, Allouaache M, Baumelou A, Rottembourg J, Jacobs C. Is overhydration in CAPD patients a contradiction to renal transplantation? Adv. Perit. Dial 194; 10: 68-72.
11. Linbald AS, Nolph KD. Hematocrit values in the CAPD/ CCPD population: A report of the national CAPD registry. Perit dial Int 1990: 10: 154-9.
12. Bleyer AJ, Burkart JM, Russell GB, Adams PL. Dialysis modality and delayed graft function after cadaveric renal transplantation. J Am Soc Nephrol 1999; 10: 154-9.
13. Kuno T, Matsumoto K. Clinical benefit of preserving residual renal function in patients after initiation of dialysis. Blood Purif 2004; 22 Suppl 2: 67-71.
14. Chanda SM, Ferrington K. Residual renal function-consideration on its importance and preservation in dialysis patients. Semin Dial 2004; 17 (30: 196-201).
15. Schollmeyer P, Bozkurt F. The immune status of the uremic patient: Hemodialysis vs CAPD. Clin Nephrol 1998; 30 Suppl: S 37 – S40.
16. Hisano S, Miyazaki C ,Hatae K, Kaku Y, Yamane I, Ueda K, Okamura S. Immune status of children on continuous ambulatory peritoneal dialysis. Pediatr Nephrol 1992; 6: 179-81.
17. Gelfand M, Kois J, Quillin B, Rotellar C, Gelba C, Barnard W, Helfrich W, Wichester J, Schreiner G. CAPD yields inferior transplant results compared to hemodialysis (abstract). Perit Dial Bull 1984; 4 (Suppl): 26
18. Gokal R. Kost S. Peritoneal dialysis immediately post-transplantation. Adv Perit Dial 1999; 15: 112-5.
19. Douzdjian V, Abecassis M. Deep wound infections in

simultaneously pancreas – Kidney transplant recipient on peritoneal dialysis. Nephrol Dial Transplant 1995: 10: 533-6.

20. Bitker MO. Peritoneal dialysis and renal or renal – pancreas transplantation. Nephrologie 1995; 16: 137-40.

21. Cacciarelli TV, Sumrani NB, Di Benedetto A, Hong JH, Sommer BG. The influence of mode of dialysis pretransplantation on long term renal allograft outcome. Ren Fail 1993; 15: 545-50.

22. Perez-Fontan M, Rodriquez-Carmona A, Bouza P, Garcia FT, Moncalian J, Oliver J, Valdes F. Outcome of grafts with long lasting delayed function after renal transplantation. Transplantation 1996; 62: 42-7.

23. Van Biesen W, Vanholder R, Van Loo A, Van DV, Lamiere N. Peritoneal dialysis favourably influences early graft function after renal transplantation compared to hemodialysis. Transplantation 2000; 69: 508-14.

24. Maiorca R, Sandrini S, Cancarini GC, Camerini C, Scolari F, Cristinelli L, Filippini M. Kidney transplantation in peritoneal dialysis patients. Perit Dial Int 1994; 4 (Suppl 3): 162-8.

25. Murphy BG, hill CM, Middleton D, etal. Increased renal allograft thrombosis in CAPD patients. Nephrol Dial Transplant 1994; 9:1166-9.

26. Vander Vliet JA, Barendrigt WB, Hoitsma AJ, Buskins MG. Increased incidence of renal allograft thrombosis after continuous ambulatory peritoneal dialysis. Clin Transplant 1996; 10: 51-4.

27. Ojo AO, Hanson JA, Wolfe RA, Agodoa LY. Leavy SF, Leichtman A, Young EW, Port FK. Dialysis modality and the risk of allograft thrombosis in adult renal transplant recipients. Kidney Int 1999; 55: 1952-60.

28. Perez-Fontan M, Rodriquez-Carmona A, Bouza P, Garcia falcon T, Tresancos C, Bouza P, Valdes F. Peritoneal dialysis is not a risk factor for primary vascular graft thrombosis after renal transplantation. Perit Dial Int 1998; 18: 311-6.

29. Bakir N, Shuter WJ, Ploeg RJ, Van Son WJ, Tegzers AM. Primary renal graft thrombosis. Nephrol Dial Transplant 1996; 11: 140-7.

30. O'Donoghue D, Manos J, Pearson R, Scott P, Bakram A, Johnson R, Dyer P, Martin S, Gokal R. Continuous ambulatory peritoneal dialysis and renal transplantation. A ten year experience in a single center. Perit Dial Int 1992; 12:242-9.

31. Palmer JA, Kaiser BA, Polinsky MS, Dunn SP, Braas C, Waltz R, Balnarte HJ. Peritoneal dialysis catheter infections in children after renal transplantation: Choosing the time of removal. Pediatr Nephrol 1994; 8: 715-8.

32. Papalois BE, Tropmann C, Grnesner AC, Benedetti E, Sutherland DE, Gruessner RW. Long tern peritoneal dialysis before transplantation and intra – abdominal infection after simultaneously pancreas – Kidney transplantation. Arch Surg 1996; 131: 761-6.

33. Miemos- Foley J, Paunio M, Lyytikainen O, Salmela K, Bacteremia among kidney transplant recipients: A case control study of risk factors and short-term outcome. Scand J Infect Dis 2000; 32: 69-73.

34. Bakir N, Surachno S, Skuter WJ, Struojk DG: Peritonitis in peritoneal dialysis patients after renal transplantation. Nephrol Dial Transplant 1993; 13: 3178-83.

35. Lamiere N, Niesen WV, Vanholder R . Impact of peritoneal dialysis on patient and graft outcome after kidney transplantation. Contrib Nephrol 2003; 140: 226-241.

36. Andreetta B, Verrina E, Sorino P, Edefonti A, Perfumo F, Bassi S, Ghio L, Cattarelli D, Coppor R, Rinaldi S, Capasso G, Zanon GF, Zacchello G. Complications linked to chronic peritoneal dialysis in children after kidney transplantation: Experience of the Italian registry of pediatric Chronic Peritoneal dialysis. Perit Dial Int 1996; 16 (Suppl): 570-3.

37. Tobe S, Chu MG, Bargmam JM. Characterization of peritoneal transport in patients with failed renal allograft receiving CAPD. Adv Perit Dial 1991; 7: 39-43.

38. Davies SJ. Peritoneal dialysis in the patient with a failing renal allograft. Perit Dial Int 2001; 21 (Suppl 3): 280-84.

39. Salahudeen AK, Kearvey PM, Hawkins T, Wilkinson R. Is anemia during continuous ambulatory peritoneal dialysis really better than during haemodialysis? Lancet 1983; i:1049-9.

40. Van Wiyck DB, Stivelman JC, Ruiz J, kielin LF, Katz MA, Odgen DA. Orin status in patients receiving erythropoietin for dialysis-associated anemia. Kidney Int 1989; 35: 712-6.

41. Murphy BG, McNamee P, Duly E, Henry W, Archibold P, Trinick T. Increased serum apolipoprotein (a) in patients with chronic renal failure treated with continuous ambulatory peritoneal dialysis. Atherosclerosis 1992; 93 53-7.

42. Vazin ND, shah GM, Winer RL, Gonzales E, Patel B, Alignahi S, Ngnyen QX, Yamamoto J. Coagulation cascade, fibrinolytic system, antithrombin III, protein C and protein S in patients maintained on continuous ambulatory peritoneal dialysis. Thromb Res 1989; 53: 173-80.

43. Speiser W, Wojta J, Korninger C, Kirchheimer CJ, Zazgornik J, Binder RB. Enhanced fibrinolysis caused by tissue plasminogen activator release in hemodialysis. Kidney Int 1987; 32:280-3.

44. Rottembourg JB. CAPD is more advantageous than hemodialysis. Semin Dial 1992; 5:212-4.

45. Maiorca R, Cancarini CG, Brunori G, Camerini C, Manili L. Morbidity & mortality of CAPD and hemodialysis. Kdiney Int. 1993; 43 (Suppl 4): S4-S15.

Hypotension in Peritoneal Dialysis.

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Abstract : **Hypotension is not an uncommon complication in dialysis patients. Though Hemodialysis induced hypotension is a well discussed situation, hypotension in PD is not a frequently discussed topic. Hypovolemia, anti hypertensive medications, cardio vascular dysfunction, autonomic dysfunction are some of the common causes of hypotension in peritoneal dialysis. Hypotension, by itself or its association with other co-morbid conditions is associated with increased mortality. Various pharmacological and non pharmacological methods have been proposed as treatment options of hypotension in peritoneal dialysis. In this article, the topic of hypotension in peritoneal dialysis is discussed with reference to a patient. The causes of hypotension are discussed in relation to the patient's clinical situation.**

Keywords : **Hypotension, cardio vascular complications, peritoneal dialysis.**

Introduction

Hypotension is a common problem in Hemodialysis. The causes of dialysis-induced hypotension are multifactorial. Hypovolemia, mainly caused by improper ultra filtration, is con-sidered to be the leading factor. (1) Concomitant diseases, drug intake, blood -membrane interactions, dialysate tempe-rature and others also contribute to intra-dialytic hypotension. (2, 3, 4, 5) Apart from causing discomfort, dialysis-induced hypotension results in a higher mortality rate for patients suffering from this problem.

The excellent control of hypertension achieved by continuous ambulatory peritoneal dialysis (CAPD) described in the original publications on this treatment (6, 7) has been confirmed by subsequent investigators. Thus Saldanha et al. studied the sequential blood pressure recordings in 63 CAPD patients transferred from hemodialysis (HD) (group 1) and in 97 patients started on CAPD de novo (group 2), over periods ranging from 3 to 63 months. At I month both groups showed a prompt improvement in blood pressure control that appeared to be volume-related and was reflected by reductions in body weight. Both groups showed an additional decline in blood pressure at approximately 6 months. These authors concluded that CAPD may be more effective than HD in controlling blood pressure. While most patients on CAPD become normotensive, some may actually develop hypotension.

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Hypotension in patients on CAPD is almost an unexplored area in the literature This complication is well documented among patients on CAPD, although the literature contains very little about its pathophysiology and management.

Blood pressure shows an inverse association with mortality in patients with chronic kidney disease (casaba et al. NDT 2006). Low blood pressure could also be a surrogate marker of certain co morbidities that develop gradually over the course of progressive CKD. (Agarwal etal. KI 2005)

Incidence of Hypotension in CAPD

Hypotension may be defined as a systolic blood pressure of < 100mm Hg in supine posture on two or more occasions. Using this definition, Cannaud et al. (8) found hypotension in 2 (10%) of 20 patients and Marquez Julio et al. (9) in 17 (16%) of 105 patients. Shetty et.al (10) analyzed the incidences of hypotension in their patients and estimated that 12 % of their patients had hypotension in CAPD. They also concluded that the mortality rate was higher among hypotensive patients than among the nonhypotensives on CAPD.

Case History: 65 years old female, known to have diabetic nephropathy, with ESRD was on Hemodialysis (at a different

center) for few months. She had recurrent fluid overloaded state during dialysis. She is known to have Ischemic Heart Disease. She also did not have a good vascular access for dialysis and she was not fit for her renal transplantation.

At this juncture she was transferred to CAPD, during 2007. She was advised 3 exchanges per day. Her blood pressure was 160 / 90 mm Hg during HD which improved to 130 / 70 mm Hg after initiating on PD. After few months she complained of early morning giddiness.

She had lost 5 kg weight over the last few months and was significantly dehydrated. Her blood pressure was 130 / 90 mm Hg on lying down, 100 / 70 mm Hg on sitting and 80 / 60 mm Hg on standing. She was using 1.5 % Dianeal solution in the morning and 2.5 % solution in the afternoon and 4.25 % Dianeal solution for her night time exchanges. She had total ultra filtration of about 1.5 liters per day in her CAPD and maintained an urine output of 700 mls/ day. She was restricting her salt and water intake, as she had a fear of cardiac failure and she was also on diuretics.

Orthostatic drop in blood pressure is not frequently checked in practice.This leads to faulty assessment of hydration status. In spite of adequate instructions on salt and fluid relaxation - the fear of cardiac failure, (what the patient experienced on HD), made her to restrict her salt and water. Also the diuretic therapy and the wrong usage of her Dianeal fluid concentration aggravated her volume depletion.

HYPOVOLEMIC HYPOTENSION in CAPD – is the commonest cause. Close to 40 % of the hypotensive episodes are due to intravascular volume depletion. The main factors governing sodium removal are plasma sodium concentration, dialysate osmolality, dialysate sodium concentration, and volume of ultra filtration. Educating the patient and the care providers on the assessment of hydration and proper usage of the fluid concentration are important. The knowledge of measuring the weight daily, monitoring the blood pressure on the supine, sitting and on standing position at least once daily is essential.

She was counseled appropriately and her concentration of CAPD fluid was adjusted and she improved significantly. Her blood pressure stabilized at 120 / 80 mm Hg. She was advised to follow with her family physician.

History (cont): She started having intermittent headaches and her blood pressure recorded by the family physician was high (180 / 100 mm Hg). Her anti hypertensive drugs were increased and she did not feel well. She came back for a review. She was on 3 anti hypertensive drugs at that time and her 'Ambulatory Blood pressure monitoring' showed that she had significant hypotension. Her anti hypertensive drugs were reduced and her symptoms improved.

HYPOTENSION DUE TO ANTI HYPERTENSIVE DRUGS contributes to around 10 -15 % of the causes for hypotension. Dose adjustment of anti hypertensive drugs improves the blood pressure.

History (cont) She did well over the next few years and developed breathlessness on exertion, that was progressive. Her urine output fell to less than 200 ml per day .She also had low blood pressures – 100 / 70 mm Hg and had bibasal crepitations and elevated jugular venous pressure.

HYPOTENSION DUE TO CARDIAC FAILURE: contributes to 25 % of the hypotensive episodes. Cardiovascular disease is responsible for at least half of all deaths in end-stage renal disease patients on maintenance dialysis and is attributed to the very high prevalence of left ventricular hypertrophy and dysfunction, cardiac failure, coronary artery disease and other atherosclerotic complications. Apart from traditional risk factors such as smoking, hypertension, diabetes and dyslipidemia, these patients are at risk of accelerated atherosclerosis and other cardiovascular complications as a result of non-traditional risk factors such as inflammation, anemia, increased oxidative stress, hyperparathyroidism and excessive calcium phosphorus load. (11)

There are several studies available that proved that the mortality on patients with ESRD is significantly higher than the general population. Also the presence of coronary artery diseases, cardiac failure and Left ventricular hypertrophy is significantly higher in patients with renal failure.

Treatment of hypotension induced cardiac failure includes improvement of the Left ventricular functions, management of Ischemic heart diseases, diuretics , anemia management, ensuring dialysis adequacy and other supportive methods.

History (cont) She underwent Coronary angiogram which revealed significant triple vessel disease. She underwent CABG (Coronary Artery Bypass Surgery) and her LVfunction and the blood pressure improved. She maintained a urine output of 400 mls per day and she did well subsequently.

The next few months were uneventful, but she again developed gradual reduction in her blood pressure that was refractory to treatment and she died subsequently.

Table 1 : Pharmacological Interventions

Vasoconstriction
Midodrine
Phenylpropanolamine
Ephedrine
Phenylephrine
Prevent Vasodilatation
Prostaglandin Synthetase Inhabitors
Indomethacin
Metoclopramide
Domeperidone
Alpha adrenoceptor sensitivity Increase
Fludrocortisone
Adenosine Receptor Blockade
Caffeine
Increase red cell mass
Erythropoietin

Table 2 : Norpharmacological Interventions

Do's
Decrease Ultrafiltration
Elastic Stockings and Abdominal Binders
Head up-tilt during sleeep
Leg crossover during standing
Dont's
Large meal rich in carbohydrates
Sudden head up postural change
High environmental temperature
Offending agents

HYPOTENSION IN CAPD – OTHER CAUSES: autonomic neuropathy, hypoalbuminemia, occult sepsis, age associated poor baroreceptor mechanisms are some of the causes of hypotension on CAPD. There also remains a large group of patients in whom no obvious causes could be made.

Various treatment modalities – pharmacological and non – pharmacological, were tried in these patients (Table 1 & Table 2).

Conclusion :

Hypotension in CAPD is an increasingly recognized complication. As the patient survival increases over years, we all encounter patients with these situations. Hypovolemia is the commonest and easily treatable cause of hypotension in dialysis. Drug induced hypotension is another easily identifiable and correctable causes of hypotension. Cardio vascular causes of hypotension is common as most of the patients on CAPD have pre existing cardio vascular diseases, that increases over years on PD. Identification of this problem may be easy, but management is difficult. Also there are many less common causes of hypotension on PD. Pharmacological and non pharmacological methods are advocated to treat , but the results are less satisfactory.

Irrespective of the cause of hypotension, the mortality associated with this condition is higher than normotensive group. Alexander et al (12) had shown that patients on PD with systolic blood pressure less than 100 mm Hg has 2.7 times increased mortality.

References :

1. Maeda K, Morita H, Shinzato T, et al. Role of hypovolemia in dialysis-induced hypotension. Artif Organs 1988;12:116-21.
2. Converse RL Jr, Jacobsen TN, Jost CM, et al. Paradoxical withdrawal of reflex vaso-constriction as a cause of hemodialysis-induced hypotension. J Clin Invest 1992; 90:1657-65.
3. Henderson LW. Hemodynamic instability during different forms of dialysis therapy: do we really know why? Blood Purif 1996;14:395-404.
4. Henrich WL. Hemodynamic instability during hemodialysis. Kidney Int 1986;30:605-12
5. Ligtenberg G, Barnas MG, Koomans HA.Intradialytic hypotension: new insights into the mechanism of vasovagal syncope. Nephrol Dial Transplant 1998;13:2745-7.
6. Saldanha LF, Wesler EWJ, Gonick HC. Effect of continuous ambulatory peritoneal dialysis on blood pressure control. Am J Kidney Dis 1993; 21:184-8.

7. Rottembourg J, Bellio P, Maiga K, Remaoun M, Rousselie F, Legrain M. Visual function, blood pressure and blood glucose in diabetic patients undergoing continuous ambulatory peritoneal dialysis. Proc EDTA-ERA 1984; 21:330-4.

8. Marquez-Julio A, Dombros N, Osmond D, et al. Hypotension in patients on continuous ambulatory peritoneal dialysis.

9. Legrain M, ed. Continuous ambulatory peritoneal dialysis -proceedings of an international symposium. Amsterdam: Excerpta Medical, 1980:263-7.

10. Shetty A; Afthentopoulos IE; Oreopoulos DG Hypotension on continuous ambulatory peritoneal dialysis. Clinical Nephrology 1996 ; 45 (6): 390 -97.

11. Wang, AngelayEE – Moon. Cardiovascular risk in long-term peritoneal dialysis patients. 2005

12. Alexander et al. The association between BP and mortality in patient on chronic teritorial dialysis. Nephrol Dial Transplant 2005; 20: 1693–1701

Use of CAPD in a child with bilateral ureterostomies

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Abstract: **A three year old male baby weighing 10 kgs with congenital anomalies of kidney ureter and bladder was initiated on CAPD. He had a functioning ureterostomy on the left side which was discharging urine and ureterostomy on the right side was closed previously. He is on 500cc four times a day. This case report high lights usefulness of CAPD has bridge for the transplant in a child with ureterostomy.**

Key Words: **CAPD in children, ureterostomy, posterior urethral valve.**

Introduction

Congenital anomalies of the genitourinary tract and kidneys leading to chronic kidney disease in utero is a major diagnostic and therapeutic challenge. Inspite of early diagnosis, surgical management after birth may not reverse or slow down the progress of CKD. Chronic kidney disease and resulting uremic complications predispose to neurological, metabolic, mineral bone density, hematological and growth retardation. However, conservative management and initiation of appropriate dialytic modality will enable growth and partial correction of other metabolic abnormalities. Chronic peritoneal dialysis including CAPD or APD are considered to be the choice of renal replacement therapy in neonates, infants and children, as this provides round the clock uremic control. Here, we describe the successful use of CAPD in a child who had posterior urethral valve repair and bilateral ureterostomy with urine drainage in the left flank (Figure 1).

Case report

A 3yr old boy, born on June 2005 by normal vaginal delivery had no urine output 2 days since birth. Ultrasound showed bilateral hydronephrosis with posterior uretheral valve. Investigations revealed blood urea and creatinine were 46 mg/dl and 4.2 mg/dl respectively. On 3rd day of birth, suprapubic cystotomy was done and urine was drained. On 5th day of birth, fulguration of posterior uretheral valve was perfomed. A week after the procedure, his renal parameters were elevated, for which bilateral ureterostomy was performed. Following the procedure, the blood urea and creatinine rose to 137 mg/dl and 7.3 mg/dl respectively, which came down subsequently. On September 2008, right ureterstomy closure was done. Further, he was managed with prophylactic antibiotics, sodium bicarbonate and vitamin D therapy.

Figure-1. Urine leaking from the ureterostomy site.

Picture has to be come

Later, the boy was admitted under our care for further management. On admission temp 37.5 C, pulse 92/min, BP 101/57 mm Hg, height 90 cm, weight 10.6 kg and BSA 0.21 /m^2. Investigations revealed blood urea 162 mg/dl, serum creatinine 3.8 mg/dl, sodium 140 mEq/L, potassium 4

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mEq/L, bicarbonate 35 mEq/L, chloride 92 mEq/L, hemoglobin 6 g/dl, WBC 11,900 cells/cu.mm, polymorph 18.5%, lymphocyte 70%, eosinophil 5.9%, monocyte 4.6% and basophil 0.2%, calcium 10.3 mg/dl, phosphorus 6 mg/dl, magnesium 2.4 mg/dl, total protein 8.3 mg/dl, albumin 4.4. mg/dl, uric acid 5.1 mg.dl, 25-hydroxy Vitamin D - 26.8 ng/ml, Serum Iron 132 µg/dl, TIBC- 324 µg/dl. T.Sat 40.74%, hs CRP 0.47 mg/L and PTH 278 pg/ml. His medications are calcitriol 0.25 mcg OD, syrup. Cefaclor 2.5 mg HS, syrup calcium carbonate 10 ml HS, colloidal iron hydoxide 250 mg, folic acid 500 µg, vitamin B12 5 µg OD, syrup multivitamin 5 ml OD, Inj. Erythropoietin 1000 units/ twice weekly SQ.

In view of his uremia and stunted growth with metabolic abnormalities, a pediatric double cuff swan neck Tenchkoff catheter was inserted in the operating room under general anesthesia. The catheter was flushed with 500 ml of dianeal, however the outflow was poor hence omentectomy was performed, after which the inflow and outflow was adequate. Omental biopsy showed lymphoid hyperplasia, congestion and negative for granuloma as shown in figure 2. He was initiated two weeks later on three exchanges of 500 ml of 1.5% PD fluid with dwelling time of five hours with night dry. As he was hyperkalemic and continued to be hyperphosphatemic, dialysis exchanges were increased to 500 ml 4 times a day round the clock. Ultrafiltration achieved was 500 ml/day with urine output of 100-200 ml/day. The combined weekly peritoneal equilibration test (kt/v) was 2.18. To rehabilitate him, he plays football at home which has strengthened his lower limbs. Later, there was a significant improvement in weight gain, height and head circumference.

Figure-2. Omental biopsy showing inflammation and congestion

Picture has to be come

Discussion

Posterior urethral valve (also known as congenital obstructing urethral membrane) are the most common cause of bladder outlet obstruction in boys. The incidence may vary from 1 in 8000 to 1 in 25000 live birth.[1] and about 10 % of prenatally diagnosed hydronephrosis. [2]. The predisposing factors for occurrence of end stage renal disease in children with PUV are delay in the diagnosis, persistent vesicoureteric reflex and associated renal dysplasia.[3].

Chronic peritoneal dialysis is a suitable therapy for children until they undergo a successful renal transplantation. The presence of nephrostomy should not deter the treating nephrologists from providing chronic peritoneal dialysis. However, the exchanges need to be performed with utmost precaution to prevent contamination from the urine coming out of the nephrostomy site. Treatment of anemia and mineral bone disease, nutritional, psychological counseling for parents and physical rehabilitation are essential compartment of uremia therapy in infants and children who are on chronic peritoneal dialysis. Table 1 summarizes the recommended nutritional therapy for children on chronic peritoneal dialysis (4-6). The use of vitamin D and phosphate binders along with appropriate nutrition and supplemental B-complex and other fat-soluble vitamins with periodic dietary counseling will prevent malnutrition. Early initiation of recombinant human growth hormone therapy (0.18 mg/kg body weight/week subcutaneous or intramuscular (Maximum of 0.3 mg/kg/week) divided into equal doses given on 3 alternate days or 6 times/week or daily) is recommended to promote longitudinal growth and has been shown that it results in marked improvement of final adult height (7,8). Prevention of peritoneal catheter related infection in children include avoidance of pull and torsion of catheter, daily exit site care, prompt treatment of upper respiratory infections and prophylactic use of antibiotics with congenital abnormalities of genitourinary tract. Children on dialysis should receive all of the standard childhood immunizations in addition to expanded age group usage of the influenza and pneumococcal vaccines (9-11).

Table-1 - Guidelines for nutritional therapy for children receiving chronic peritoneal dialysis

Nutient	Infant	Pre-puberty	Puberty	Post-puberty
Energy (kcal/kg/day)	110-150	70-100	Male 60	Male 60
			Female 48	Female-48
Protein (g/kg/day)	1.5-2.0	1.4-1.5	1.0-1.2	1.0-1.2
Fat	50% of dietary intake (polyunsaturated:saturated fatty acid ratio 0f 1.5:1.0			
Carbohydrate	35% of dietary intake			
Vitamins				
Pyridoxine(B6)	0.3-0.6 mg/day			
Ascorbic acid	15-45 mg/day			
Folic acid	60-200 mg/day			

References

1. Atwell, J.D., *Posterior urethral valves in the British Isles: a multicenter B.A.P.S. review.* J Pediatr Surg 1983; 18(1):70-4.
2. Brown, T., J. Mandell, and R.L. Lebowitz, *Neonatal hydronephrosis in the era of sonography.* AJR Am J Roentgenol 1987; 148(5): 959-63.
3. Tejani, A., et al., *Predictors of eventual end stage renal disease in children with posterior urethral valves.* J Urol 1986; 136(4): 857-60.
4. Nelson P, Stoker J et al. Principles of nutritional assessment and management of the child with ESRD. In: Fine R, Gruskin A, editors. End-stage renal disease in children. Philadelphia: WB Saunders 1984; 209-226.
5. Hellerstein S, Holliday M et al. Nutritional management of children with chronic renal failure. Summary of the task force on nutritional management of children with chronic renal failure. Pediatr Nephrol 1987; 1:195-211.
6. Salusky I. Nutritional management of pediatric patients on chronic dialysis. In:Nissenson A, Fine R, Gentile D,editors, Clinical dialysis. Norwalk, : Appleton & Lange 1995; 535-548.
7. Fine R, Ho M et al. Adverse events with rhGH treatnment of patients with chronic renal insufficiency and end-stage renal disease. J Pediatr 2003; 142:539-545.
8. Haffner D, Schaefer F et al. Effect of growth hormone treatment on the adult height of children with chronic renal failure. N Engl J Med 2000; 343:923-930.
9. Neu A. Immunizations. In: Warady B, Schaefer F, Fine R, Alexander S, editors. Pediatric Dialysis. Norwell: Kluwer Academic Publishers 2004; 383-392.
10. Fivush B, Nu A. Immunization guidelines for pediatric renal disease. Semin Nephrol 1998; 18:256-263.
11. Committee on Infectious diseases. Recommended immunization schedules for children and adolescents – United States, 2007. Pediatrics 2007; 119:207-208.

Acute hydrothorax complicating intermittent peritoneal dialysis: A case report and review of literature

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Abstract : **We report a case of acute hydrothorax as a complication of intermittent peritoneal dialysis in a patient with acute renal failure. The diagnosis was made on the basis of high pleural fluid glucose level and high pleural fluid gradient to serum glucose. The hydrothorax subsided on cessation of intermittent peritoneal dialysis and therapeutic tapping of pleural fluid. We have also reviewed the literature.**

Key words: **Acute hydrothorax, Intermittent peritoneal dialysis**

Introduction

Acute hydrothorax is an uncommon but serious complication of peritoneal dialysis. Hydrothorax in such conditions is often massive and right sided and is because of the leakage of the hypertonic glucose peritoneal solution through the pleura-peritoneal communication, facilitated by increase in intra-abdominal pressure. Diagnosis of this complication of peritoneal dialysis is clinically important, as it is frequently wrongly diagnosed as fluid overload and treated with more hypertonic solutions leading to more accumulation of pleural fluid. Most of the literature has described the development of acute hydrothorax in continuous ambulatory peritoneal dialysis (CAPD). It is uncommon in intermittent peritoneal dialysis (IPD) as compared to CAPD as patients are supine with lower intra-peritoneal pressure. However it may still occur, if patient has pre-existing diaphragmatic defect/ communication. We report a case of acute hydrothorax complicating intermittent peritoneal dialysis.

Case Report

A 40 years old female was admitted in the medical ICU through the emergency with complains of fever of 2 days duration associated with cough with mucopurulent expectoration and gradually progressive breathlessness. On examination patient was tachypnoeic (RR=32/min), cyanosed and with slight alteration of sensorium. Pulse rate=110/min, feeble. BP was initially unrecordable and after 1 L of intravenous fluids it was 90/60 mmHg. Spo2 was 84% in room air. Chest examination revealed dull note in percussion in right infra clavicular area, with crackles. Rest of the systemic examination were normal. Chest X-ray shows right upper zone consolidation. Blood report reveals Urea72mg/dl, creatininie 4.4mg/dl, Na/K 129/ 5.5mmol/l, TC 7900cells/cumm, DC N83L17, Hb14.4gm/dl, Biluribin total 3mg/dl, direct 1.2mg/dl, PT(INR) 42(6.52) .

Patient was admitted with the diagnosis of right upper lobe community accquired pneumonia with sepsis with MODS (deranged LFT, and AKI) with septic shock.

She was admitted in the medical ICU and treated with ionotropic support (dopamine/dobutamine), inj cefipine and inj vancomycin in renal adjusted doses, and inj vit K for 3 days.

Patient was started on intermittent peritoneal dialysis (IPD) with the plan to do a total of 72 cycles of PD. The renal parameters of the patient started improving and urine output increasing gradually after 20 cycles of PD. However after about 40 cycles of PD, patient's breathlessnes further increased with Spo2 falling < 80%, so she was intubated and kept in mechanical ventilation in SIMV mode. Repeat x-ray chest done showed moderate right sided pleural effusion. Diagnostic pleural fluid tapping was clear and showed TC 20cells/cumm, DCN40L60, Sugar 416mg/dl, Protein 0.8mg/dl, Gram stain and culture were negative, ADA was normal (5.6 U/L). Simultaneously obtained blood sugar was 108 mg/dl.

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Because of the presence of high pleural fluid glucose level (416 mg/dl) and high pleural fluid gradient to serum glucose (416-108 = 308), we diagnosed the development of right sided pleural effusion a complication of IPD through the pleura-peritoneal communication. So we stopped PD after 42 cycles. About 500 ml of therapeutic pleural fluid tapping was done. Patient was extubated on 8 th day and she survived with gradual restoration of renal functions to normal levels (serum creatinine: 4.4—3.1—0.9—0.7). Repeat x-ray chest done after the extubation showed very minimal pleural effusion. Patient was discharged on 11 th day of admission.

Discussion and review of literature:

Intermittent peritoneal dialysis (IPD) for acute kidney injury (AKI) is a cheap, easy and readily available mode of renal replacement therapy (RRT) in developing countries like ours (1). Continuous ambulatory peritoneal dialysis (CAPD) is also the well accepted mode of renal replacement therapy in patients with end stage renal disease. Both the modalities involve the abdominal instillation of a variable volume of dialysis solution giving rise to an "artificial ascites", which itself is a predisposing factor for the development of hydrothorax.

Hydrothorax associated with abnormal communication between the pleural and peritoneal cavities (pleuroperitoneal communication) was first described by Meigs, who reported the coexistence of pleural effusion and ascites associated with ovarian fibroma (2). Subsequently Ratnoff, quoted by Popper gave one of the first descriptions of hydrothorax as a complication of ascites associated with liver cirrhosis (3).

Hydrothorax as a complication of peritoneal dialysis was first described by Edward, Unger, Finn, and Jowett in the 1960s (4, 5). Since then others have reported such cases and examined different aspects of this complication (6-14). Almost all of these descriptions were in patients on CAPD. Indeed, the incidence of hydrothorax is more common in CAPD patients than in patients who are in IPD, and this is because in IPD patients are in supine position with lower intra abdominal pressure. It has been estimated to be present in about 1.6 to 10 % of the PD population (8, 10). Our discussion of acute hydrothorax as a complication of peritoneal dialysis is also based on the review of literature on CAPD, however it is also applicable in IPD.
Although generally not life threatening, this complication of peritoneal dialysis is serious as this transudative pleural effusion is often misdiagnosed as fluid overload and treated with more hypertonic dialysis solution leading to further accumulation of the pleural effusion. Furthermore it often leads to temporary or permanent withdrawl from PD and switch to hemodialysis. Hence recognition and diagnosis of this complication of PD becomes important.

At present four procedures are there to diagnose the pleuroperitoneal communication: (a) the study of pleural fluid and serum glucose and protein, (b) the intraperitoneal instillation of methylene blue, (c) radionuclide studies and (d) Contrast CT peritoneography.

(a) The study of pleural fluid and serum glucose and protein: Pleural fluid glucose level in cases of pleural effusion due to pleuroperitoneal communication is similar to that of the dialysis fluid and almost always higher than the simultaneously obtained patient's blood sugar level, even if he/she is diabetic (15). Recently Chow et al has reported that a pleural fluid to serum glucose gradient of > 50 mg/dl has 100% sensitivity and specificity in differentiating hydrothorax secondary to pleuroperitoneal communication from other causes (16). Though it was not proved 100% sensitive in subsequent studies by Tang et al (17), there is a general consensus that a high pleural fluid glucose level and high pleural fluid glucose gradient to serum glucose in patients on PD is almost always because of the leakage of the dialysate fluid through the pleuro peritoneal communication. Study done by Tang et al (17) has also shown that a low pleural fluid protein concentration (<4 gm/L) is also the most consistent finding in such cases. Biochemical analysis of the pleural fluid for the diagnosis of pleuroperitoneal communication is a cheap, easily available and less risky investigation.

(b) Methylene blue test for the diagnosis of pleuroperitoneal communication is now not recommended at all because of the serious risk of chemical peritonitis (18-20). Furthermore the test is not conclusive in all the cases.

(c) Radionuclide scanning: several workers have reported that this procedure effectively demonstrates a pleura peritoneal communication (21-23). Either Technetium 99m-tagged macroaggregated albumin (MAA) or human serum albumin (HAS) is used in the dialysate bag. The radioactive risk to the patient is low. However these tests are sophisticated, expensive and are not so easily available, especially in developing countries like ours.

(d) Contrast CT peritoneography: In this method new non-ionic, isotonic iodate contrast media such as Metrizamide (Amipaque:Nyegarde), Ioxaglate (Hexabrix, May and Barker) and now Iopamidol (Niopam, Merk) are used (24-25). Iopamiro (150 ml) is diluted into 2 l of peritoneal dialysate solution, and the diluted contrast medium is then instilled into the peritoneal cavity through the Tenckhoff catheter. After dwelling for 2 h, 10 mm

computed tomographic axial sections are taken from thorax to abdomen and pelvis. Delayed films are taken at 24 h (17). However one should also keep in mind that radionuclide studies and contrast CT peritoneography are also not the obsolute tests for the detection of pleuroperitoneal communication.

The pathogenesis of these pleural effusions is also not so clear. Meigs has suggested that the hydrothorax is due to transfer of ascites via diaphragmatic lymphatics (2). Others suggest that the fluid passes through anatomical defects in the diaphragm (26-27). Similarity of pleural fluid composition to that of the peritoneal dialysate, and the fact that methylene blue passes from the peritoneal to pleural cavity support the either hypothesis. The predominance of the right sided effusions is also because of the abundant lymphatic supply and diaphragmatic defects in the right side as demonstrated by thoracoscopy or autopsy (28). High intraperitoneal pressure along with low intrathoracic pressure during inspiration also facilitates the transfer of fluid. High incidences of acute hydrothorax in patients with polycystic kidney disease is also because the kidneys volume decreases abdominal capacity and the subsequent infusion of dialysate increases the hydrostatic pressure (29). It is possible that a valve phenomenon may have contributed to this by preventing backflow from the pleural space to the abdominal cavity during phases of positive intrathoracic pressure.

The optimal treatment of this condition is also still undefined. Initially it was thought that the development of this complication calls for permanent discontinuation of CAPD (30). Conservative management consisted of drainage of pleural effusion and temporary treatment with hemodialysis (2-4 weeks), which has resulted in limited success [41%-54% (8, 31)]. Recurrence is high once the patient is again put on the usual dose of CAPD. Some authors advocate resuming PD with a higher number of lower volume exchanges or putting the patient on automated PD, which produces lower increase in intra-abdominal pressure. To prevent recurrences, chemical pleurodesis is commonly advocated using substances: asbestos-free talc, tetracyclines, and more recently autologous blood obtained from a peripheral vein (32). A novel method that has been recently described is videoassisted talc pleurodesis (17). For patients for whom the above measures fail, surgical repair of the pleural peritoneal communication could be tried (31).

In conclusion, with the increasing use of PD in Asia we should expect to encounter more patients with hydrothorax in future secondary to such dialysis. The diagnosis could be practically made by the presence of high pleural fluid glucose level and high pleural fluid to serum glucose gradient. When-ever possible CT contrast peritinography should be done to demonstrate the pleuroperitoneal communication. We are also planning to perform CT contrast peritinography if we again face such complications in our CAPD patients. The treatment options should be based on patient's willingness to continue PD and the existing facilities in the hospital.

References:

(1) Sharma SK, Manandhar D, Singh J, Chauhan HS et al. Acute peritoneal dialysis in eastern Nepal. Perit Dial Int 2003; 23:S196-199.

(2) Meigs JV, Armstrong SH, Hamilton HH. A further contribution to the syndrome of fibroma of the ovary with fluid in the abdomen and chest: Meig's syndrome. Am J Obst Gynecol 1943; 46:19-21.

(3) Ratnoff OD, Patek Jr AJ. In: EI hí gado. Suestructuray finci&oacute ;n.Popper H, Schaffner F, Noguer eds. Barcelona: 1962.

(4) Edward SR, Unger AM. Acute hydrothorax a new complication of peritoneal dialysis. JAMA 1967; 199 ;853-5.

(5) Finn R, Jowett EW. Acute hydrothorax: complication of peritoneal dialysis.Br Med J 1970; 2:94.

(6) Holm J, Leiden B, Lindgust B. Unilateral effusion, a rare complication of peritoneal dialysis. Scand J Urol Nephrol 1971; 5:84-5.

(7) Khanna R, Oreopoulos DG. Complications of peritoneal dialysis other than peritonitis. In: Peritoneal dialysis. Nolph K, ed. Boston: Kluwer Academic, 1985:441.

(8) Nomoto Y, Suga T, Nakajima K, Sakai H, Osawa G, Ota K, Kawaguchi Y, et al. Acute hydrothorax in continuous ambulatory peritoneal dialysis-a collaborative study of 161 centers. Am J Nephrol 1989; 9;363-7.

(9) Shemin D, Clark DD, Chazan JA. Unexplained pleural effusions in the peritoneal dialysis population. Perit Dial Int 1989; 9: 143-4.

(10) Chow CC, Sung JY, Cheung CK, Hamilton-Wood C, Lai KN. Massive hydrothorax in continuous ambulatory peritoneal dialysis. Diagnosis, management and review of the literature. NJ Med J 1988; 101:475-7.

(11) Grefberg N, Danielson B, Benson L. Rightsided hydrothorax complicating peritoneal dialysis. Nephron 1983; 34: 130-4.

(12) Boeschoten EW, Krediet RT, Ross CM, Kloek JJ, Schipper MEI, Arisz L. Leakage of dialysate across the diaphragm: an important complication of continuous ambulatory peritoneal dialysis. Neth J Med 1986; 29: 242-6.

(13) Green A, Logan M, Medawar W, McGrath F, Keeling F, Carmody M, et al. The management of hydrothorax in continuous ambulatory peritoneal dialysis. Perit Dial Int 1990; 10:271-4.

(14) Winchester J, Kriger FL. Fluids leaks: prevention and treatment. Perit Dial Int 1994; 14(Suppl 3):$437

(15) R. Garcia Ramon, A. Miguel Carrasco. Hydrothorax in peritoneal dialysis. Perit Dial Int;18, 5-10.

(16) Chow KM, Szeto CC, Wong TY, Li PK. Hydrothorax complicating peritoneal dialysis: diagnostic value of glucose concentration in pleural fluid aspirate. Perit Dial Int 2002; 22: 525-528.

(17) Tang S, Chui WH, Tang AWC, Li FK, Chau WS, et al. Video-assisted thoracoscopic talc pleurodesis is effective for maintenance of peritoneal dialysis in acute htdrothorax complicating peritoneal dialysis. Nephrol Dial Transplant 2003; 18: 804-8.

(18) Singh S, Prabnakar V, Dale A et al. Massive hydrothorax complicating continuous ambulatory peritoneal dialysis. Nephron 1983; 34:168-172.

(19) Steiner R. Adverse effects of intraperitoneal methylene blue. Perit Dial Bull 1983; 3:43.

(20) Kennedy JM. Procedures used to demonstrate a pleuroperitoneal communication: a review. Perit Dial Bull 1985; 3: 168-70.

(21) Adam W, Arkles L, Gill G et al. Hydrothorax with peritoneal dialysis: radionuclide detection of a pleuroperitoneal connection. Aust NZ Med 1980; 10: 330-332.

(22) Spadaro J, Thakur V, Nolph KD. Technetium 99m-labelled macroaggregated albumin in demonstration of trans-diaphragmatic leakage of dialysate in peritoneal dialysis. Am J Nephrol 1982; 2: 36-38.

(23) Gibbons G, Baumert J. Unilateral hydrothorax complicating peritoneal dialysis; use of radionuclide imaging. Clin Nuclear Med 1983; 8: 83-84.

(24) Ginai AZ. Experimental evaluation of various available contrast agents for use in the gastrointestinal tract in case of suspected leakage. Effects on the peritoneum. Brit I RadioI 1985; 58: 969-978.

(25) Walker F, McAllister C, Mckee P, McNutty J. Intraperitoneal iopamidol, a new radio contrast agent in the diagnosis of a pleural communication. Perit Dia; Bull 1986; 6: 108-9.

(26) Emerson PA, Davies JH. Hydrthorax complicating ascites. Lancet 1955; 268: 487.

(27) Lieberman FL. Hidemura R. Peters RL, Reynolds TB. Pathogenesis and treatment of hydrothorax complicating cirrhosis with ascites. Ann Intern Med 1966; 64: 341.

(28) Haberli R, Stucki P. Akuter hydrothorax als komplikation bei peritoneal dialyse. Praxis 1971; 1: 13.

(29) Fletcher S, Turney JH, Brownjohn AM. Increased incidence of hydrothorax complicating peritoneal dialysis in patients with adult polycystic kidney disease. Nephrol Dial Transplant 1994; 9: 832-833.

(30) Khanna R. Questions and answers. Perit Dial Bull 1980; 1: 17-8.

(31) Allen SM, Mat thews HR. Surgical treatment of massive hydrothorax complicating continuous ambulatory peritoneal dialysis. Clin Nephrol 1991; 36: 299-301.

(32) Hidai H, Takatsu S, Chiba T. Intrathoracic instillation of autologous blood in treating massive hydrothorax following CAPD. Perit Dial Int 1989; 221-2.

Intraperitoneal hematoma as cause of technique failure in a CAPD patient

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Abstract: **A 63 years old lady has uneventful course on CAPD for 9 years except for 3 episodes of peritonitis. The last episode of peritonitis was refractory necessitating catheter removal. An attempt was made to reinitiate PD after eight weeks .However this failed due to intraperitoneal hematoma leading to technique failure.**

Key words: **Peritonitis, intraperitoneal hematoma**

Introduction

Continuous ambulatory peritoneal dialysis (CAPD) is an established form of renal replacement therapy in India for more than a decade in India. It has been increasingly used as an alternative to hemodialysis because of potential advantages of fewer symptoms of hemodynamic instability during dialysis, resulting in better tolerance by patient with ischemic heart disease and more liberal fluid, sodium and potassium intake in CAPD patients (1).

Although, peritonitis is still the major cause of technique failure in these patients (2). An important aspect of treatment success in CAPD is the non infectious complications of peritoneal dialysis. These non infectious complications are obstruction, malposition of catheter, hernia and dialysate leakage. These complications are also responsible for treatment failure of these patients on CAPD. The catheter related complications like post Tenckhoff catheter insertion bleeding and intra abdominal hematoma is a rare cause of treatment failure in CAPD patients(3). We report a case of technique failure following intraperitoneal hematoma after catheter insertion in a patient who continued CAPD for 9 years.

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Case Report

A 63 years old lady had developed end stage renal disease due to hypertensive nephrosclerosis. She was initiated on CAPD on 23rd June 2000 after break in period of 2 weeks. Her transport characteristic was high average transporter and weekly Kt/V was 1.9. She had uneventful course on CAPD till 2004. She developed first episodes of peritonitis in December 2004 which resolved with intraperitoneal antibiotic cefazolin and tobramycin. She again had second episode of peritonitis in November 2006 which also resolved with intraperitoneal administration of antibiotics at home. Her weekly Kt/V following 2nd episode of peritonitis was 1.64 and her general well being was fine. However, the lady had developed 3rd episode of peritonitis on 5th December 2008and she had been started empirical intraperitoneal cefazolin and tobramycin at home. But there was no response to this first line antibiotic and she presented to us with turbid effluent for 7 days, pain abdomen for 5 days, and fever for 3 days. She had rebound tenderness on palpation. Total leukocyte count of PD fluid was 1800 cells/cmm and PD fluid culture was sterile. She had been started on Vancomycin , ceftazidime intraperitoneally and pipercillin tazobactum intravenously . But PD effluent was still cloudy and peritonitis did not respond to antibiotics. Subsequently CAPD catheter was removed on 21st December 2008 and she had been shifted to temporary maintenance hemodialysis but patient was keen to continue on CAPD.

She was readmitted for catheter insertion which was done on 24th February 2009 laparoscopically. She had intraperitoneal adhesions and omentum was adherent to abdominal wall.

Omentum was separated and omemtectomy was done. CAPD catheter was inserted. Post operative flushing with 2 liters of PD fluid showed good inflow and outflow but the outflow was hemorrhagic. The patient showed a fall in hemoglobin from 8.1g/dl pre operative period to 5.7 g/dl post operative period 8th day. Four units of packed RBC (PRBC) was transfused post operatively. On post op day 15th patient developed pain in abdomen associated with bilious vomiting .Examination revealed an intra abdominal lump in left epigastrium and umbilical region and absent bowel sound. USG abdomen showed a large heteroechoic multiseptated lesion extending from epigastric region to infraumbilical region more on left side and another septated collection was noted in subhepatic region of approximately 80 cc volumes. A CT Abdomen was done which showed a large intra abdominal collection of size 22.5cm X 8.5 cm X 12 cm extending from sub diaphragmatic region to pelvis, anteriorly over stomach with CAPD catheter tip in the collection (Figure 1). A CT angiography of abdomen was also done which did not show any evidence of abdominal aneurysm or active bleed. In consultation with surgical gastroenterology, patient was managed conservatively by keeping her nil orally with continuous ryles tube drainage, and parenteral nutrition till bowel sounds became normal on 20th day post operative day. She has been advised for catheter removal but the patient was not willing for the same. Meanwhile a left Brachial AV fistula was created and CAPD catheter was removed on 4th April 2009 once the family consented. The general condition of patient showed improvement with size of intra abdominal lump showing a decreasing trend on clinical examination. The Patient was tolerating MHD sessions well and was discharged on 10th April 2009 in a stable condition. She has been shifted on maintenance hemodialysis but she had sudden death at home after 10 days.

Discussion

This long surviving case of CAPD has developed technique failure consequent upon peritonitis, catheter removal, reinsertion of catheter and intra abdominal hematoma after surgery. In a study by Stefano R et al has observed 274 catheter related complications: 182 catheter infections (exit-site and/or tunnel infection), 23 leakages, 19 obstructions, 19 cuff extrusions, 14 dislocations and 6 hemoperitoneum. The incidence of hemoperitoneum was 2.18% (4). The complications following CAPD catheter insertion can be classified as early complications, that occur within 30 days of CAPD insertion and includes wound hematoma/infection, malposition /poor flow, exit site infection, early peritonitis and pericatheter leak and Intraperitoneal hematoma / hemoperitoneum while late complications are those occurring after 30 days of Tenckhoff catheter insertion and include CAPD peritonitis, catheter blockage/poor flow and scrotal swelling (5). This lady has uneventful course on CAPD for 9 years except for 3 episodes of peritonitis. The last episode of peritonitis was refractory and subsequent series of complication lead to technique failure. Peritonitis continues to be a serious complication of patients on CAPD and is one of the major cause for hospitalization of these patients accounting for 23% of admission in the CANUSA study (6) Peritonitis is the leading cause for technique failure and catheter loss and patient with frequent peritonitis are at increased risk of dying ,independent of other factors (7). Catheter removal for resolution of peritonitis is required in 10.2 % at our center and catheter reinsertion becomes possible only in 13.0% of these patients (8). Published guidelines suggest that after an episode of severe peritonitis that requires Tenckhoff catheter removal, peritoneal dialysis can be resumed after a minimum of 3 week (9). This lady has been reinserted catheter after 8 weeks of catheter removal. In a study from Hong Kong, 100 patients in whom CAPD catheter was reinserted following refractory peritonitis, CAPD could only be reinstituted in 51 patients only while 49 remaining had been shifted to maintenance Hemodialysis due to technique failure (10). After resumption of CAPD there was a significant decline in net ultrafiltration in the success group and the overall technique survival in success group at 24 months was 30.8 %. The study concluded that after an episode of refractory peritonitis requiring catheter removal only a small group of patient can be successfully maintained on peritoneal dialysis. Interestingly there was no significant difference in the baseline characteristics and the etiology of the peritonitis in the two groups (10).In an Italian study by Stefano R et al, infection (78.3%), obstruction (10.4%), malposition (3.8%), cuff extrusion (2.8%), leakage (1.9%), bowel incarceration (1.9%) and bowel infarction (0.9%) were the mentioned causes of CAPD catheter removal. Hemoperitoneum was not mentioned as a cause of catheter removal in this study (4). Our patient has successful reinsertion of catheter but hemoperitoneum lead to removal of catheter.

This patient was keen to continue on peritoneal dialysis despite refractory peritonitis and catheter removal. Now, CAPD

has been increasingly used as an alternative to hemodialysis for treatment of End Stage Renal Disease.(11,12).CAPD has both medical and social benefits with optimal of blood pressure control ,slow and sustained ultrafiltration , ability of the patient to stay at home and increase ability to enjoy normal activities.

References:

1. Khanna R. Dialysis consideration for diabetic patients. Kidney INt 1993; 43 (Suppl 40); 558-64.
2. Van Biesen, Van Holder R, Vogelous D: The need for a center-tailored treatment protocol for peritonitis. Perit Dial Int, 1998; 18: 274-281
3. Tiong H, Poh J, Sunderraj K, et al. Surgical complication of teckhoff catheter use in continuous ambulatory peritoneal dialysis. Singapore Med J 2006; 47 (8): 707
4. Stefano R, Fruncisco S, ENrico V et al. The Italian registry of pediatric chronic peritoneal dialysis: A ten year experience with chronic peritoneal dialysis catheters. Perit Dial Int 1998; 18: 71-74.
5. Tiong H, Poh J, Sunderraj K, et al. Surgical complication of teckhoff catheter use in continuous ambulatory peritoneal dialysis. Singapore Med J 2006; 47 (8): 707.
6. CANUSA Peritoneal Dialysis Study Group: Adequacy of dialysis and nutrition in continuous peritoneal dialysis: Association with clinical outcome. J Am Soc Nephrol, 1996; 7: 198-207.
7. Fried LF, Bernardini J, Johnston JR. Peritonitis influences mortality in peritoneal dialysis patient. J Am Soc Nephrol , 1996; 7: 2176-2182 Keane WF, Alexander SR, Baite GR, et al. Peritoneal dialysis related Peritonitis treatment recommendation: 1996 update Perit Dial Int 1996; 16: 557-573.
8. Prasad N et al. Outcome of gram-positive and-negative peritonitis in patient on continuous ambulatory peritoneal dialysis: A single centre experience : *Peritoneal Dialysis International2003;* 23 (suppl2):144-147
9. Keane WF, Baibe GF, Boeschoten E, et al. Peritoneal dialysis related peritonitis treatment recommendations; 2000 Update Perit Dial Int 2000; 20: 396-411.
10. Szeto CC, Chow KM, Wong TYH: Feasibility of resuming peritoneal dialysis after severe peritonitis and tenckhoff catheter removal. J Am Soc Nephrol 2002; 1040-1045.
11. Popovich RP, Moncrief JW, Dechrd JF, et al. The definition of a novel portable wearable peritoneal technique. Abs Ann Soc Artif Internal Organ 1976; 5: 64.
12. Nolph KD, Lindhbald AS, Nova JW. Current concept. Continuous ambulatory peritoneal dialysis. N Eng J Med 1988; 318: 1595-600

Literature Review

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Perit Dial Int 2010; 30:41–45:

The effects of previous abdominal operations and intraperitoneal adhesions on the outcome of peritoneal dialysis catheters

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Background: Patients with previous history of abdominal operations are sometimes excluded from consideration for peritoneal dialysis because of concerns for increased riskof complications during the implantation procedure and inadequate dialysis due to reduced peritoneal surface area. Employing a laparoscopic approach, we compared the outcome of peritoneal dialysis catheters in 2 groups of patients with and without intra-abdominal adhesions.

Methods: All data in this report were recorded prospectively. Revision-free and overall survival of catheters, the incidence of mechanical and infectious complication, and surgical revision rates were compared between the 2 groups.

Results: In 217 successful catheter implantations, there was a history of previous abdominal surgery in 42.9% of procedures; only 26.9% of them had intraperitoneal adhesions; 2.8% of patients without history of previous abdominal surgery had intraperitoneal adhesions. There were no significant differences between the 2 groups for 1- and 2-year revision-free and overall catheter survival, mechanical dysfunction, infectious complications, or surgical revision rates.

Conclusion: History of previous abdominal surgery should not be used to judge the eligibility of patients for peritoneal dialysis. Laparoscopic placement is the best way to ensure optimal catheter outcomes equivalent to patients without previous abdominal surgery.

Comments: CAPD is an increasingly popular modality of treatment for end stage renal disease patients. However despite widespread acceptance of CAPD, patients with previous history of abdominal surgeries are excluded from offering CAPD ad treatment for ESRD individuals. Laparoscopy provides a relatively noninvasive method to fully investigate the peritoneal cavity and also to select an uninvolved site for catheter placement. According to this study nearly 2/3rd patients with previous surgery had no intraperitoneal adhesions, who would have otherwise been excluded from placing CAPD catheter. Patients should not be deprived the opportunity to pursue PD because of a history of abdominal operations.

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Computed Tomographic Findings Characteristic for encapsulating peritoneal sclerosis : A case-control study

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Background: Computed tomography (CT) is often used to confirm the diagnosis of encapsulating peritoneal sclerosis (EPS) but there is no consensus on specific CT abnormalities. To establish CT findings characteristic for EPS, we compared CT findings between EPS patients and long-term peritoneal dialysis (PD) patients without EPS.

Methods: We included as cases all EPS patients in our center from 1996 to 2008 that nderwent a CT scan at the time of diagnosis. Controls were all other long-term PD patients (PD duration ³ 4 years) without EPS that had a CT scan for different reasons. The CT scans were blindly and independently reviewed by 3 radiologists: 2 abdominal radiologists with PD knowledge (Observers 1 and 2) and 1 radiologist without PD experience (Observer 3).

Results: We included 15 EPS patients and 16 controls. Observer 1 found 6 CT findings that were significantly more often present in EPS than in controls (p £ 0.05): peritoneal enhancement, thickening, and calcifications; adhesions of bowel loops; signs of obstruction; and fluid loculation/ septation. Observer 2 scored almost identically but Observer 3 scored differently. The sensitivity and specificity of a combination of specific CT findings were, respectively, 100% and 94% for Observers 1 and 2, and 79% and 88% for Observer 3.

Conclusion: CT scans showed characteristic abnormalities that were significantly more often present in EPS patients compared to long-term PD control patients. CT can be used to confirm the diagnosis of EPS when experienced radiologists apply a combination of specific CT findings.

Comments: A good study supporting the importance of recognizing the cardio-renal syndrome wherein early initiation of CAPD helps in controlling the volume status and also in preserving the residual renal functions. It also emphasizes the use of CAPD in these patients to reduce repeated hospitalizations for recurrent CHF and anemia.

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Relationship between double-cuff versus single-cuff peritoneal dialysis catheters and risk of peritonitis.

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Background: Peritonitis among peritoneal dialysis (PD) patients remains an important complication. To date, no catheter type has consistently been shown to reduce peritonitis risk. It has been hypothesized that double-cuff catheters might be superior to single-cuff catheters in preventing peritonitis caused by periluminal entry of organisms.

Methods: Using data collected in the multicentre Canadian Baxter Peritonitis Organism Exit-Sites Tunnel Infections (POET) database between 1996 and 2005, the association between number of catheter cuffs and peritonitis was tested. Variables adjusted for in the negative binomial model included age, gender, race, diabetes, renal disease, transfer from haemodialysis, previous renal transplant, PD modality and swan neck versus straight catheter.

Results: Data were available for 4247 incident patients with a total of 2555 peritonitis episodes, corresponding to a peritonitis rate of 0.364 per dialysis year at risk. After adjustment for covariates, double-cuff catheter use was associated with a trend towards a lower peritonitis rate ratio (RR) 0.90, 95% confidence interval (CI) 0.80-1.01, P = 0.08]. This trend was largely due to a decreased Staphylococcus aureus peritonitis rate in those with a double-cuff catheter (RR 0.46, 95% CI 0.33-0.64, P < 0.001). When stratified by era of PD initiation, the benefit of double-cuff catheters was seen only among those initiating PD before 2001.

Conclusions: Use of a double-cuff PD catheter is associated with a reduction in S. aureus peritonitis. Loss of the association between cuff number and peritonitis after the year 2000 may relate to changes in exit-site care that reduce the bacterial burden available for periluminal migration.

Comments: Though this articles shows apparent increase in the incidence of peritonitits in patients who had single cuff PD catheter compared to double cuff, when stratified for the time beyond 2001 there was no significant difference. This is of more relevance now as there is an increasing trend for the Nephrologists to place CAPD catheter with peel away sheath and single cuff.

Diabetic kidney disease: Act now or pay later

Robert C Atkins and Paul Zimmet
For the 2010 International Society of Nephrology/International Federation of Kidney Foundations World Kidney Day Steering Committee* (RA) and the International Diabetes Federation (PZ)

World Kidney Day 11 March 2010: we must act on diabetic kidney disease

In 2003, the International Society of Nephrology and the International Diabetes Federation launched a booklet called "Diabetes and Kidney Disease: Time to act" [1] to highlight the global pandemic of type 2 diabetes and diabetic kidney disease. It aimed to alert governments, health organisations, providers, doctors and patients to the increasing health and socio-economic problems due to diabetic kidney disease and its sequelae, end stage kidney disease requiring dialysis and cardiovascular death. Seven years later, the same message has become even more urgent. World Kidney Day 2010, under the auspices of the International Society of Nephrology (ISN) and the International Federation of Kidney Foundations IFKF), together with the International Diabetes Federation(IDF), provides yet another chance to underline the importance of diabetic kidney disease, stress its lack of awareness at both public and government levels and emphasise that its management involves prevention, recognition and treatment of its complications. Primary prevention of type 2 diabetes will require massive lifestyle changes in the developing and developed world supported by strong governmental commitment to promote lifestyle and societal change.

The Global Threat of Type 2 Diabetes

The 21st century has the most diabetogenic environment in human history [2, 3]. Over the past 25 years or so, the prevalence of type 2 diabetes in the USA has almost doubled, with three- to five-fold increases in India, Indonesia, China, Korea and Thailand [4]. In 2007, there were 246 million people with diabetes in the world, but by 2025, that number is estimated to reach 380 million [5]. People with impaired glucose tolerance, a "prediabetic state" numbered 308 million in 2007 and will increase to 418 million by 2025 [5]. The increase in prevalence of diabetes will be greater in the developing countries. In Mexico for example, 18% of its adult population will have with type 2 diabetes by 2025. According to the WHO, China and India will have about 130 million diabetics by 2025 who will consume about 40% of their country's healthcare budget in addition to reducing productivity and hindering economic growth.

It was against this background that on December 21st 2006, the United Nations General Assembly unanimously passed Resolution 61/225 declaring diabetes an international public health issue and identifying World Diabetes Day as a United Nations Day, only the second disease after HIV/AIDS to attain that status. For the first time, governments have acknowledged that a non-infectious disease poses as serious a threat to world health as infectious diseases like HIV/AIDS, tuberculosis and malaria. The problems of diabetes are now seen as a major global public health concern, especially in the developing world which can least afford it. The first step to act on diabetic kidney disease must encompass public health campaigns aimed at preventing the development of type 2 diabetes.

Diabetic Kidney Disease

Diabetes is now the major cause of end stage kidney failure throughout the world in both developed and emerging nations [6]. It is the primary diagnosis causing kidney disease in 20- 40% of people starting treatment for end stage renal disease worldwide [7]. In Australia, the number of new type 2 diabetes patients starting dialysis increased 5-fold between 1993 and 2007 [8]. Between 1983 and 2005, there was a 7-fold increase in new patients starting renal replacement therapy in Japan because of diabetes, accounting for 40% of all new incidence patients [9]. Thus, some 30% of the predicted US$1.1 trillion medical costs of dialysis world- wide during this decade will result from diabetic nephropathy [10].

In the United Kingdom Prospective Diabetes Study (UKPDS), the rates of progression of newly diagnosed type 2 diabetics between the stages of normoalbuminuria, microalbuminuria, macroalbuminuria and renal failure were 2-3% per year [11]. Over a median of 15 years of follow-up of 4,000 participants, almost 40% developed microalbuminuria [12]. In the DEMAND study of 32,208 people from 33 countries with known type 2 diabetes attending their family doctor, 39% had microalbuminuria and prevalence increased with age, duration of diabetes and presence of hypertension [13]). About 30% of the UKPDS cohort

developed renal impairment, of which almost 50% did not have preceding albuminuria [12]. Reduced glomerular filtration rate and albuminuria caused by diabetic nephropathy are independent risk factors for cardiovascular events and death [14]. Therefore, a strategy to detect early diabetic kidney disease by screening for albuminuria as well as reduced glomerular filtration rate is the second step in taking action on diabetic kidney disease.

An added difficulty to overcome is the remarkable lack of awareness among patients about their condition. In population-based surveys, for every known diabetic patient, there is at least one more that is unknown [15]; only 8.7% of the general population were able to identify diabetes as a risk factor for kidney disease [16]. For patients with diabetic kidney disease, very few are aware of their condition with some community surveys putting patient awareness of their disease as low as 9.4%, particularly among those with milder impairment [17]. Thus, public education is the third step required for acting on diabetic kidney disease in the community. The IFKF has a long term goal for all kidney patients world-wide to not only be aware of their disease, but to actively know for example their blood pressure and the treatment objectives.

Management of Diabetic Kidney Disease

There is little use in screening populations or "at risk" groups unless follow up is undertaken and effective treatment is begun and assessed [18]. Fortunately, there is evidence that early therapeutic intervention in patients with chronic kidney disease or diabetes can delay onset of complications and improve outcomes. For example, the UKPDS [19, 20], STENO-2 [21], and ADVANCE studies [22-24] all demonstrated that tight control of blood glucose level, blood pressure (and lipids in STENO-2) significantly reduced incidence and progression of diabetic kidney disease. In people with type 2 diabetes, inhibition of the renin-angiotensin-aldosterone system using an angiotensin-converting enzyme inhibitor or an angiotensin receptor blocker decreased the progression from normoalbuminuria to microalbuminuria [25], reduced the progression from micro albuminuria to macroalbuminuria [26], and slowed the development of ESRD [27]. Thus the use of an ACE inhibitor or ARB is now standard therapy for patients with diabetic nephropathy as well as glucose, lipid and blood pressure control. Effective management using evidence-based therapies is the fourth step in tackling diabetic kidney disease.

The fifth step is development of new therapies. Many new agents are now in clinical trials to reduce renal damage and fibrosis, including agents that block formation of advanced glycation endproducts and other signalling pathways. Other novel agents may potentially prove to be effective in large randomised double-blind clinical trials [28].

How can we Act Now?

The steps to be taken are clear: campaigns aimed at (1) prevention of type 2 diabetes; (2) screening for early diabetic kidney disease; (3) increasing patient awareness of kidney disease; (4) using medications of proven strategy, and, finally, (5) researching and trialling of new therapies. The ultimate challenge is to get action from primary health care to all higher levels; from the individual patient, to those at risk, in various health jurisdictions, in all countries despite varying economic circumstances and priorities. The problem is a global one and yet requires action at a local level - prevention screening and treatment strategies; education, including increasing awareness both in diabetic patients and those at risk of developing diabetes; and health priorities and governments. Basic research and clinical trials searching for a new understanding and therapies must be supported.

The United Nations, as noted earlier, recognised the importance of diabetes in 2006 by establishing a World Diabetes Day. Both the ISN and the International Diabetes Federation are working closely with WHO to provide increasing understanding of the challenge that diabetic kidney disease poses to world health and health care budgets. However, World Kidney Day also provides a focus for other international agencies, government ministries of health, non-government organisation, foundations and academic institutions to come together with national kidney foundations to be involved in the effort to prevent and manage diabetic kidney disease.

The ISN through it's COMGAN Research and Prevention Committee has developed a web-based program, the KHDC (for detection and management of chronic kidney disease, hypertension, diabetes and cardio vascular disease in developing countries (http://www.nature.com/isn/education/guidelines/isn/pdf/ed_051027_2x1.pdf) as a global template involving a detection management and data assessment program which has so far screened some 42,000 people in 25 developing countries and the data are being stored and analyzed at the Kidney Disease Data Center at the committee headquarters at the Mario Negri Institute in Bergamo, Italy. This program can be

tailored to any individual country's needs and resources. The IFKF also has a program initiated by the National Kidney Foundation in the USA called the Kidney Early Evaluation Program (KEEP) which is a screening program for people at high risk of kidney disease. KEEP has now been implemented in many countries and will again screen and manage patients with diabetic kidney disease.

The focus on diabetic kidney disease for World Kidney Day 2010 brings awareness of the magnitude of the problem and ramifications for global health for people with diabetes and kidney disease. It is therefore time to act and act urgently. It is time for strategies that prevent diabetes and its sequelae. It is time for programs for health care workers to diagnose and treat people with diabetic kidney disease. It is time for governments to pass legislation to enable the diabetes pandemic to be controlled. After all, diabetic kidney disease, like the epidemics of infectious diseases that have long dominated public health agendas, is potentially preventable. Indeed, March 11, 2010 is time to act on diabetic kidney disease and to commit to sustaining that action long after World Kidney Day.

▷ **ISN/IFKF 2010 World Kidney Day Steering Committee**: William G Couser, MD, Miguel Riella MD, Co-chairpersons. Georgi Abraham MD, Paul Beerkens, John Feehally MD, Guillermo Garcia-Garcia MD, Dan Larson, Philip KT Li MD, Bernardo Rodriguez-Iturbe, MD

References

1. International Diabetes Federation and International Society of Nephrology, Diabetes and kidney disease : time to act. 2003: Brussels.
2. Zimmet, P., K. Alberti, and J. Shaw, Global and societal implications of the diabetes epidemic. Nature, 2001. 414: p. 782-7.
3. King, H., R. Aubert, and W. Herman, Global burden of diabetes, 1995-2025: prevalence, numerical estimates, and projections. Diabetes Care, 1998. 21: p. 1414 -31.
4. Yoon, K., et al., Epidemic obesity and type 2 diabetes in Asia. Lancet, 2006. 368: p.1681-8.
5. Sicree, R., J. Shaw, and P. Zimmet, Diabetes and impaired glucose tolerance. , in Diabetes Atlas, 3rd edition, D. Gan, Editor. 2006, International Diabetes Federation: Brussels. p. 15-109.
6. Reutens, AT., L. Prentice, and R. Atkins, The Epidemiology of Diabetic Kidney Disease, in The Epidemiology of Diabetes Mellitus, 2nd Edition, J. Ekoé, et al., Editors. 2008, John Wiley & Sons Ltd: Chichester. p. 499-518.
7. National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases. International comparisons, in 2007 Annual Data Report: Atlas of Chronic Kidney Disease and End-Stage Renal Disease in the United States. 2007, National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases. : Bethesda. p. 239-54.
8. Appendix II, in ANZDATA Registry Report 2008, S. McDonald, L. Excell, and B. Livingston, Editors. 2008, Australia and New Zealand Dialysis and Transplant Registry: Adelaide. p. 1-97.
9. Yamagata, K., et al., Chronic kidney disease perspectives in Japan and the importance of urinalysis screening. Clin Exp Nephrol, 2008. 12: p. 1-8.
10. Lysaght, M., Maintenance dialysis population dynamics: Current trends and long term implications. J Am Soc Nephrol, 2002. 13: p. S37-40.
11. Adler, A., et al., Development and progression of nephropathy in type 2 diabetes: the United Kingdom Prospective Diabetes Study (UKPDS 64). Kidney Int 2003. 63: p. 225-32.
12. Retnakaran, R., et al., Risk factors for renal dysfunction in type 2 diabetes: U.K.Prospective Diabetes Study 74. Diabetes, 2006. 55(6): p. 1832-9.
13. Parving, H., et al., Prevalence and risk factors for microalbuminuria in a referred cohort of type II diabetic patients: a global perspective. Kidney Int, 2006. 69(11): p. 2057-63.
14. Ninomiya, T., et al., Albuminuria and kidney function independently predict cardiovascular and renal outcomes in diabetes. J Am Soc Nephrol, 2009. 20(8): p. 1813-21.
15. Dunstan, D., et al., The rising prevalence of diabetes and impaired glucose tolerance: the Australian Diabetes, Obesity and Lifestyle Study. Diabetes Care, 2002. 25(5): p. 829-34.
16. White, S., et al., Limited knowledge of kidney disease in a survey of AusDiab study participants. Med J Aust, 2008. 188(4): p. 204-8.

17. Whaley-Connell, A., et al., Diabetes mellitus and CKD awareness: the Kidney Early Evaluation Program (KEEP) and National Health and Nutrition Examination Survey (NHANES). Am J Kidney Dis, 2009. 53(4 Suppl 4): p. S11-21.

18. Thomas, M., G. Viberti, and P. Groop, Screening for chronic kidney disease in patients with diabetes: are we missing the point? Nat Clin Pract Nephrol, 2008. 4(1): p. 2-3.

19. Holman, R., et al., 10-year follow-up of intensive glucose control in type 2 diabetes. N Engl J Med, 2008. 359(15): p. 1577-89.

20. Bilous, R., Microvascular disease: what does the UKPDS tell us about diabetic nephropathy? Diabet Med, 2008. 25(Suppl 2): p. 25-9.

21. Gaede, P., et al., Effect of a multifactorial intervention on mortality in type 2 diabetes. N Engl J Med. , 2008. 358(6): p. 580-91.

22. Patel, A., et al., Effects of a fixed combination of perindopril and indapamide on macrovascular and microvascular outcomes in patients with type 2 diabetes mellitus (the ADVANCE trial): a randomised controlled trial. Lancet, 2007. 370: p. 829-40.

23. Group), A.C., et al., Intensive blood glucose control and vascular outcomes in patients with type 2 diabetes. N Engl J Med, 2008. 358: p. 2560-72.

24. Zoungas, S., et al., The combined effects of routine blood pressure lowering and intensive glucose control on macrovascular and microvascular outcomes in patients with type 2 diabetes; new results from ADVANCE. Diabetes Care, 2009. Aug 3. [Epub ahead of print].

25. Ruggenenti, P., et al., Preventing microalbuminuria in type 2 diabetes. N Engl J Med., 2004. 351(19): p. 1941-51.

26. Parving, H., et al., The effect of irbesartan on the development of diabetic nephropathy in patients with type 2 diabetes. N Engl J Med, 2001. 345(12): p. 870-8.

27. Lewis, E., et al., Renoprotective effect of the angiotensin-receptor antagonist irbesartan in patients with nephropathy due to type 2 diabetes. N Eng J Med, 2001. 345: p. 851-60.

28. Burney, B., R. Kalaitzidis, and G. Bakris, Novel therapies of diabetic nephropathy. Curr Opin Nephrol Hypertens, 2009. 18(2): p. 107-11.

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Letters to the editor: Letters dealing with published articles or matters of interest to researchers are invited. They should be short(not more than 2 papers, key references included), typed double spaced, and include references where appropriate. When a published article is involved, the original authors will be invited to submit a response.

Nomenclature and abbreviations: Where possible, nomenclature and abbreviations should be in accordance with internationally agreed rules.

Manuscript preparation: Type the manuscript on standard A4 or 8.5" x 11" white bond paper, font size – 10 in Times New Roman. Use double spacing throughout, including the references and figure legends. Organize the manuscript in the order indicated below with each component beginning on a separate page. Type a running title and page number in the upper right hand corner of each paper. **Manuscripts can be submitted by electronic media with adobe reader**

to Georgi Abraham through E-mail: abraham_georgi@yahoo.com

Title page: Page 1 should include [1] the title of the article [2] the author's full name(first name, middle, initial(s), and surname), [3] affiliations (the name of the department if any), institution, city and state where the work was done, [4] acknowledgements of grant support and of individuals who are of direct help in the preparation of the study, [5] the name, address, FAX, E-mail of the corresponding author(the author to whom reprint requests are to be sent).

Abstracts & keywords: Page 2 should include the title of the article followed by an abstract in a structured form. Following the abstracts, list up the three key words or phrases for indexing.

Text: All manuscripts should be typed on one side of the paper, double spaced.

Abbreviations & symbols: Do not use abbreviations unless absolutely necessary, do not abbreviate the names of symptoms or disease(myocardial infarction not MI) or anatomical and histological characteristics(left ventricular, not LV). Use abbreviations in figures and tables to save space. Explain all abbreviations used in the figure legend or table footnote. Proprietary and generic names is generic name for all drugs. Include the proprietary name if it is more commonly known than the generic name. Instruments may be referred by the proprietary name.

Short communications: Short communications should be organized in the following format. Introduction, material and methods, results, discussion, acknowledgements, abbreviation list, references. Authors may insert a short summary/ conclusion section following the discussion if they wish. Short communication should be no longer than 6 double space typed written pages including figures, table and key references. Short communications do not require an abstract.

Review articles: Review articles should be organized in the following form: outline(using main and second order section headings). Introduction, text, conclusions or summary, acknowledgement(optional), appendices(optional), list of abbreviations and references.

References

1. Number references in the order in which they are first cited in the text
2. Use Arabic numbers in the paranthesis,
3. Use the reference style at the National Library of Medicine, including the abbreviations of journal titles
4. Provide complete data for each reference
5. Include an "available from" note for documents that may not be readily accessible
6. Cite symposium papers only from published proceedings
7. When citing an article or book accepted for publication but not yet published, include the title of the journal (or name of the publisher) and the year of expected publication and
8. Include references to unpublished material in the text note in the references [for example papers presented orally at a meeting, unpublished work (personal communications, papers in preparation)].

Upcoming Meetings

ISPD 2010, Mexico
ISPD2010 MEXICO CITY
From July 23rd to July 26th, 2010

Indian Society of Nephrology ISNCON 2010
December 2nd to 5th 2010
Organizing Secretary
Prof. Ramdas Pisharody
Organizing Secretary – ISNCON 2010
Trivandrum.

Peritoneal Dialysis Society of India 2010
September 25th and 26th 2010
Organizing secretary - PDSI 2010
Prof. Gokulnath,
Bangalore

MRCP(UK) Examination
Organizing secretary
Dr. Suresh Sankarasubbaiyan
Nov 13-18th 2010 at MMM Hospital Chennai
Email: Overseas.queries@mrcpuk.org

"The Renny Abraham TANKER Foundation LOVE FOR SERVICE Award"

TANKER Foundation has come forward to present an award for the most outstanding Medical Doctor in India who has gone beyond the call of duty in rendering service to the underprivileged.

The Award : The award will carry a cash prize of Rs.1,00,000 a citation and a gold medaltion. The award winner's accommodation and travel by train (second class A/c) will be reimbursed.

Criteria : 1. Age No Limit 2. Medical Doctor 3. Individual, resident in India 4. The community service must be carried out in India by the individual for a minimum of 5 yrs. 5. The service must be an outstanding contribution towards helping the needy by going beyond the call of duty.

Award Selection Process : The person nominating will need to send a detailed report of the nominee including name, address, contact no. and type of work carried out and why he/she deserves the award.

The screening committee will short list the applications and forwards it to the award selection committee.

Timeline

15th Sept 30th Sept 2010	Announcement	15th Dec 31st Dec 2010	Award selection
1st Oct 30th Nov 2010	Award Submission	2nd Jan 2011	Announcement of Award winner
1st Dec 15th Dec 2010	Screening committee short list	25th Jan 2011	Award ceremony

We request you to send in your nominations accordingly. For further queries please call Mrs. Latha A. Kumaraswami (96000 40011) or e-mail us at tanker1993@gmail.com.

"TANKER Foundation and Kerala Kidney Research Foundation Muthoot M.George Memorial Research Award"

TANKER Foundation and Kerala Kidney Research Foundation have together come forward to present an award for the most outstanding young researcher in Nephrology in India.

The Award : The award will carry a cash prize of Rs.1,00,000, a citation and a gold medallion. The award winner's accommodation and travel by train (second class A/c) will be reimbursed.

Criteria : 1. Age under 45 yrs. 2. Primary researcher must have been a major contributor to the research work. 3. The research must have been done in India. 4. Co-investigators consent should be given. 5. The research must not have been presented elsewhere. 6. The research must be an outstanding contribution towards understanding kidney diseases, of relevance to India.

Award Selection Process : The applicants will need to send a detailed research 5 copies to TANKER Foundation by post and 1 copy by e-mail for review by screening committee.

The screening committee will select the submitted research project that will compete for the award and forward it to the award selection committee.

Timeline

15th Sept 30th Sept 2010	Announcement	15th Dec 31st Dec 2010	Award selection
1st Oct 30th Nov 2010	Award Submission	2nd Jan 2011	Announcement of Award winner
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We request you to send in your nominations accordingly. For further details please call Mrs. Latha Kumaraswami (96000 40011) or e-mail us at tanker1993@gmail.com.

PERITONEAL DIALYSIS SOCIETY OF INDIA

Membership Application Form

Please attach colour passport size recent photograph

Last name	First name	Middle Name
Name		
Date of birth	**Sex** Male	Female

Qualifications

Degree	Year of passing	Institute/University
MBBS		
MD/MS		
DM/DipNB/MCh		
Others (specify)		

Addresses

Work

Job title			
Institution/Hospital			
Address			
City		Pin	State
Tel	Fax	E-mail	

Home

Address			
City		Pin	State
Tel	Fax	E-mail	

Mailing Address (circle one) Work Home

Academic appointment (circle appropriate)

Full time Part time None

Primary Institutional Affiliation (circle appropriate)

Medical College Hospital Armed Forces Private practice

Primary professional interest (circle appropriate)

Adult nephrology	Pediatric nephrology	Pathology	Dietician
Nursing	Technologist	Urology	PD
Transplantation	Social Worker	Medical education	HD

Membership of other professional bodies
1
2
3
4
5
6

Signature of applicant **Place** **Date**

Fee details (Rs. 1000 for Indian and US$ 100 for overseas applicants)

Outstation Check add Rs. 50/-

DD no.	Drawn on	(Bank name)
Dated		(Branch)
In favor of *Peritoneal Dialysis Society of India,* Chennai		

Mail completed application form with supporting documents to Dr. Rajan Ravichandran, Secretary, Peritoneal Society of India, MIOT Institute of Nephrology, 4/112, Mount Poonamalle Road, Manapakkam, Chennai - 600 089. India.
Email: ravidoc55@yahoo.co.in

For Office Use

Considered at Governing body meeting at on.

Admitted as member (Membership number).

Rejected because of

President Secretary