

OUTCOME OF LAPAROSCOPIC VERSUS OPEN PYELOPLASTY IN THE TREATMENT OF PELVIURETERIC JUNCTION OBSTRUCTION: A COMPARATIVE STUDY.

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Abstract

Background: Ureteropelvic junction obstruction leads to progressive dilatation of the renal collecting system, and can result in pain and progressive deterioration of renal function but may be asymptomatic and result in complication such as pyelonephritis, calculus formation and deterioration of renal function may ensue if left untreated. Open pyeloplasty remains the gold standard against which new technique must be compared. We compared laparoscopic and open pyeloplasty in the treatment of pelviureteric junction obstruction. To see the outcome of laparoscopic pyeloplasty versus open A-H pyeloplasty in the management of pelviureteric junction obstruction.

Methods and materials: A prospective quasi experimental study was done from July 2012 to December 2013 in which a total of 30 laparoscopic and 30 open pyeloplasty were done. All laparoscopic pyeloplasties were performed transperitoneally. Standard open A H pyeloplasty, spiral flap or VY plasty was done depending on anatomical consideration. Patients were followed with USG and IVU at three and six months interval. Perioperative parameters including operative time, analgesic use, hospital stay, and complication and success rates were compared.

Results: Mean total operative time in LP group was 115 ± 15 min compared to 75 ± 15 in OP group, the postoperative analgesic requirement was significantly less in LP group (mean 84.73 ± 11 mg) and OP group required mean of (274.33 ± 39.42 mg). The mean blood loss in LP group was 118.26 ± 110.74 ml compared to open group 274.82 ± 118.97 ml. The postoperative hospital stay in LP was mean 4 days (2-7 days) significantly less than the open group mean of 8 days (7-9 days).

Conclusion: Lp has a minimal level of morbidity and short hospital stay compared to open approach. Although laparoscopic pyeloplasty has the disadvantages of longer operative time and requires significant skill of intracorporeal knotting but it is here to stay and represents an emerging standard of care.

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Introduction

Pelviureteric junction obstruction leads to progressive dilatation of the renal collection system, and can result in pain and progressive deterioration of renal function but may be asymptomatic and result in complications such as pyelonephritis, calculus formation and renal failure. Most cases are congenital in origin and most were detected before birth by prenatal ultrasonography. Children who escape diagnosis in infancy can present later in life. Most common in boys than girls (5:2) and more common in left side (5:2) and contralateral PUJ obstruction (10%). Most common

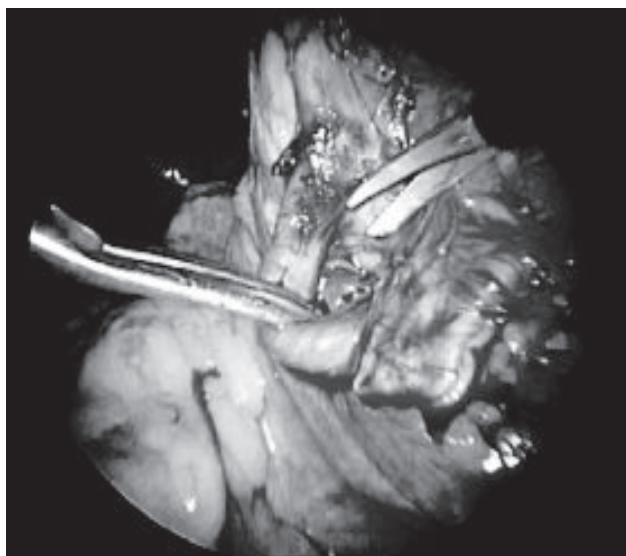
causes are intrinsic muscular defect, abnormal collagen tissue deposition in and around muscular fibre cell, aberrant blood vessels and congenital narrowing etc. Surgical management of PUJO aims to provide symptomatic relief and preserve remaining renal function. Common surgical treatment of pelviureteric junction obstruction consists of open surgical Andersen-Hynes pyeloplasty, laparoscopic approaches, and endourologic methods, (Carr 2002).

Open pyeloplasty has been the gold standard for surgical treatment of ureteropelvic junction obstruction, enjoying a long term success rate exceeding 90%. This procedure requires a muscle cutting incision that entails some degree of morbidity. The optimum surgical correction of UPJO has been a urological challenge for over a century. Open pyeloplasty originally described by Andersen and Hynes remains the gold standard against which new technique must be compared. The morbidity associated with flank incision, however, has led to development of minimally invasive approaches to UPJ repair. Over the last two decades the treatment approach to UPJ obstruction has evolved from open pyeloplasty to various minimally invasive procedures like endopyelotomy, balloon dilatation and laparoscopic pyeloplasty. These minimally invasive options are reported to be less successful than open pyeloplasty. Laparoscopic pyeloplasty was described first in 1993 by schuessler et al. Laparoscopic pyeloplasty has developed worldwide as the first minimally invasive option to match success rate of open pyeloplasty. Only one randomized study to compare laparoscopic and open pyeloplasty has been done by Turk et al in 2002. In this prospective study, we see the outcome of transperitoneal laparoscopic pyeloplasty and open A-H pyeloplasty using a minimal flank incision with regard to operative

complications, length of hospital stay, postoperative pain and return to normal activity, and radiographic outcome at 3 months and 6 months (Bansalet al, 2013).

Material and methods

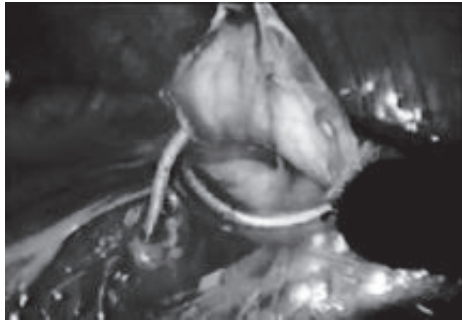
A prospective randomized study was done from July 2012 to December 2013 in which a total of 30 laparoscopic and 30 open pyeloplasty were done. All procedures were performed in Dhaka medical college and hospital and other private hospital in Dhaka city. In this prospective study, sixty consecutive patients were selected as per selection criteria from the patients attending in the out patient department of urology unit, Dhaka medical college hospital and other private medical college and hospital, Dhaka. With the complaints of flank pain, flank or abdominal mass, recurrent fever with lower urinary tract symptoms etc. The patients with above mentioned complaints were evaluated first by details history, physical examination and investigation by urinalysis, urine culture and sensitivity, complete blood count, Blood urea nitrogen, serum creatinine and ultrasonography of KUB region. Then suspected cases of PUJ obstruction were further evaluated by intravenous urography and diuretic DTPA renography as out patients basis. Then the patients with PUJ obstruction who fulfilled the selection criteria included in this study and admitted in the urology ward and numbered chronologically. Out of the 30 patients for laparoscopy 25 presented with pain and five presented with recurrent urinary tract infection. Thirty patients had pain in open pyeloplasty group while three presented with lump and one patient presented with haematuria after minor trauma. All patients underwent cystoscopy and RGP to confirm the diagnosis before the procedure. Urethral catheter was left in situ.



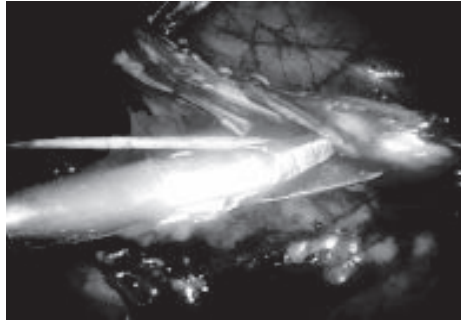
Dissection of crossing vessels



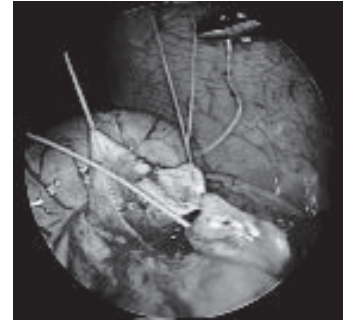
Holding suture through abdominal wall



1. Division of ureteropelvic junction



2. Lateral speculation of ureter



3. Suturing

All laparoscopic pyeloplasty were performed transperitoneally. Patients were placed in lateral kidney position. Three trocars were placed to enable dissection, retraction and identification of PUJO. Depending on the anatomical findings at time of dissection dismembered or non dismembered procedures were performed. In case of redundant pelvis reduction pyeloplasty was performed. Anatomoses were done with 4-0 polyglactin. After completion of posterior layer DJ stent was placed and then anastomosis was completed. Drain tube was inserted adjacent to repair and Foleys catheter was left in the bladder for five days. Drain was removed the fourth day if the drain output did not increase. Internal stent was removed after the fourth week. All patients were followed with USG and IVU at 3 months and 6 months and then annually.

Perioperative parameters including operative time, analgesic use, hospital stay, and complication and success rate were compared. The success was defined radiologically as a patent, unobstructed UPJ or improved or maintained renal function status and symptomatic improvement.

Result:

The demographics of two groups were similar with regard to sex, age. None had any significant co-morbid

condition. A total 30 Laparoscopic pyeloplasty and 30 patients Open pyeloplasties were performed. Mean total operative time with stent placement in LP group was 115 ±15 min compared to 75 ±15 min in open group (p <0.05). Total operative time did improved with experience for LP patients. There was no blood transfusion in any patient. The mean blood loss in LP group was 118.26 ±110.74ml. compared to 274.82 ±118.97ml. in open group (p <0.05). There was no mortality in either group.

Compare to open pyeloplasty, the mean pain score in first 24 hours following pyeloplasty was 13.48±2.7. In open group the mean pain score was 23.05±2.8 (p <0.05). Intensity of pain in first 24 hours following pyeloplasty was significantly less in laparoscopic pyeloplasty group. postoperative pethedine requirement was significantly less in LP group (mean 84.73±11.63mg) compared to open group (mean 274.33±39.42mg). The duration of analgesic requirement was also significantly less in LP group. The postoperative hospital stay in LP was mean 3.14 days (2-7 days) significantly less than open group mean 8.29 days (7-11 days) (p <0.05). There was only one major complication in laparoscopic group. That patients had prolonged drainage of urine (6 days) through the drain which subsided with prolonged catheterization. No patients in open group had any complication.

Table-I
Preoperative and postoperative characteristics of the study patients.

Variables	Laparoscopic Group	Open Group	P value
Operative time (min) (mean ± SD)	115 ± 15	75 ± 15	0.0001 ¹
Peroperative blood loss (ml) (mean ± SD)	118.26 ± 110	274.82 ± 118.97	0.0001 ¹
Pain score (mean ± SD)	13.48 ± 2.7	23.05 ± 2.8	0.0001 ¹
Postoperative hospital stay (day) (mean ± SD)	3.14	8.29	0.0001 ¹
Postoperative complication (%)	3.33	0	0.0001 ²

¹Data were analyzed by using Student's t- test.

²Data were analyzed by using Chi-square test.

Discussion:

The first successful reconstruction of an obstructed UPJO was accomplished in 1892. Since then open pyeloplasty has been the gold standard for UPJO repair and achieves success rates exceeding 90% in contemporary series. In 1983, Wicham and Kellet described percutaneous pyelolysis (endopyelotomy) which subsequently gained some popularity. Subsequently, evolution in endoscopic physiology and application together with advances in endoscopic technology fostered advances in the field. Current approaches included antegrade percutaneous retrograde ureteroscopic guided laser and retrograde acoustic balloon dilatation. The success rate of these minimally invasive options has consistently been less than with open pyeloplasty by 10-30%. The varied surgical anatomy of PUJ (huge dilatation, crossing vessels, high insertion of ureter) compromise all of these endourological procedures. These procedures are also associated with a risk of perioperative haemorrhage and 3-11% patients required blood transfusion.

Laparoscopic pyeloplasty provides a minimally invasive alternative to repair UPJO. Laparoscopic pyeloplasty was introduced in 1993 by Schussler et al and has developed worldwide as the first minimally invasive option to match success rate of open pyeloplasty. Reconstruction of UPJO can be tailored to anatomical findings at the time of surgery. The feasibility of laparoscopic pyeloplasty including Andersen-Hynes, Fengers, Foleys VY plasty performed through transperitoneal and retroperitoneal approach has been evaluated. Its potential advantages including less perioperative bleeding, less postoperative pain, shorter hospital stay and improved cosmesis have been proved. The only disadvantage seems to be longer operative time. Zhang et al reported less operative time in laparoscopic group than open group. Bansal et al, 2013 observed that total operative time with stent placement in laparoscopic pyeloplasty group was 244.2 (280-300 min) compared to 122 min (100-140 min) in open pyeloplasty group. Falahatkar et al, 2012 revealed that laparoscopic pyeloplasty (28 ± 95 min) had a significantly ($p=0.003$) higher mean operating time than open (204 ± 59 min). Nihad et al (2011) revealed that the main disadvantage of laparoscopic pyeloplasty was the longer operative time. In our study, mean operative time in laparoscopic pyeloplasty was 115 ± 15 minutes. The mean operative time in open pyeloplasty was 75 ± 15 min. Operative time was significantly longer in laparoscopic pyeloplasty group like previous studies.

As laparoscopic surgery becomes more entrenched in resident training, the more complex skills such as intracorporeal suturing becomes less daunting. Moreover, long operative time may be reduced by skill of intracorporeal knotting.

In present laparoscopic pyeloplasty, mean blood loss was 118 ± 110.74 ml. The mean blood loss in open pyeloplasty was 274.82 ± 118.97 ml. Blood loss was significantly less in laparoscopic pyeloplasty group. In a comparable study, Nihad et al, 2011 had seen that laparoscopic pyeloplasty had less blood loss, morbidity and less hospital stay than open pyeloplasty. Pain score in first 24 hours following laparoscopic pyeloplasty was 13.48 ± 2.7. In open pyeloplasty, the mean pain score was 23.05 ± 2.81. Intensity of pain in first 24 hours following pyeloplasty was significantly less in laparoscopic pyeloplasty group. In a similar comparable study, Bansal et al, 2013 had compared to open pyeloplasty group with laparoscopic and it was revealed that the postoperative analgesics requirement was significantly less in LP group. In a recent study Falahatkar et al, 2012 observed that the mean dosage of postoperative analgesics and complication rates in laparoscopic (26, 25 mg; 23.8%) were lower than open pyeloplasty (38.33 mg; 36%). In present study, pethidine requirement in laparoscopic pyeloplasty was 84.73 (±) 11.63 mg for postoperative pain management. The mean pethidine requirement in open A-H pyeloplasty was 274.33 ± 39.42 mg. Pethidine requirement was significantly less in laparoscopic pyeloplasty group ($p<0.05$).

There is very small incision and tissue trauma during laparoscopy. So, patient can be discharged early than open surgery. Falahatkar et al, 2012 revealed in their study that the mean postoperative hospital stay (LP: 4.6 ± 1.76 days; OP: 4.3 ± 1.55 days; $p=0.934$) were similar between the two groups. In laparoscopic pyeloplasty, the mean hospital stay was 4 ± 1 days for PUJ obstruction. In open pyeloplasty group, mean hospital stay was 8 ± 2 days. Hospital stay was significantly shorter in laparoscopic pyeloplasty group. It was seen that urine leakage was more in case of laparoscopic pyeloplasty which might be due to ligature and knotting during procedure. In open A-H pyeloplasty, there was more tissue handling to increased incidence of wound infection compared to laparoscopic one. In present study it was revealed that postoperative complications were significantly less in laparoscopic pyeloplasty group except urine leakage which was more in laparoscopic pyeloplasty.

If any difficulty like failure to find out renal pelvis or malrotated pelvis, and severe adhesion, laparoscopic pyeloplasty converted into open one. In present study, two (6,67%) laparoscopic patients were converted to open pyeloplasty. Klingler et al, 2003 found two patients with laparoscopic pyeloplasty required open pyeloplasty during operation among 40 subjects.

In general, the reported overall complications rate of laparoscopic pyeloplasty range from 3% -14%. The success rate of laparoscopic pyeloplasty has been reported to be consistently high at 87-98%. In the present series, we had a success rate of 93%. We considered conversion to open as a failure.

Conclusion

The result of this study showed that laparoscopic pyeloplasty is a safe procedure for management of PUJ obstruction. Laparoscopic pyeloplasty has a minimal level of morbidity and short hospital stay compared to open approach. Although, laparoscopic pyeloplasty has the disadvantages of longer operative time and requires significant skill of intracorporeal knotting. It represents an emerging standard of management for pelviureteric junction obstruction.

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