Laparoscopic Versus Open Pyeloplasty: Comparison of Two Surgical Approaches- A Single Centre Experience of Three Years

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Abstract UPJO causes hydronephrosis and progressive renal impairment may ensue if left uncorrected. Open pyeloplasty remains the standard against which new technique must be compared. We analyzed the comparison of Laparoscopic and open pyeloplasty in a randomized prospective trial. A prospective randomized study was done from January 2004 to January 2007 in which a total of 28 Laparoscopic and 34 open pyeloplasty were done. All laparoscopic pyeloplasties were performed transperitoneally. Standard open Anderson Hynes pyeloplasty, spiral flap or VY plasty was done depending on anatomic consideration. Patients were followed with DTPA scan at 3 months and IVP at 6 months. Perioperative parameters including operative time, analgesic use, hospital stay, and complication and success rates were compared. Mean total operative time with stent placement in LP group was 244.2 min (188–300 min) compared to 122 min (100–140 min) in open group. Compared to open pyeloplasty the post operative diclofenac requirement was significantly less in LP group (mean 107.14 mg) and open group required mean of (682.35 mg) The duration of analgesic requirement was also significantly less in LP group. The post operative hospital stay in LP was mean 8.29 days (7–11) and was significantly less than open group (mean 3.14 Days (2–7 days)). Open pyeloplasty has been the gold standard for UPJO repair and achieves success rates exceeding 90%. Laparoscopic pyeloplasty provides a minimally invasive alternative to repair UPJO and has developed world wide as

the first minimally option to match success rate of open pyeloplasty. Its potential advantages including less post op pain, shorter hospital stay an improved cosmesis has been proved in some comparative series. The only disadvantage seems to be longer operative time. 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.

Keywords UPJO · Laparoscopy · Pyeloplasty

Introduction

Open pyeloplasty has been the gold standard for surgical treatment of ureteropelvic junction (UPJ) obstruction, enjoying a long-term success rate exceeding 90% [1]. This procedure requires a muscle incision that entails some degree of morbidity. UPJO causes hydronephrosis and progressive renal impairment may ensue if left uncorrected [2]. The optimum surgical correction of UPJO has been a urological challenge for over a century [3]. Open pyeloplasty originally described by Andersen and Hynes [4] 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, acucise catheter incision, balloon dilatation and laparoscopic pyeloplasty. The success rate of these minimally invasive options has

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been less than with open pyeloplasty by 10–30% [5]. Laparoscopic pyeloplasty was described first in 1993 by Schuessler et al. Laparoscopic pyeloplasty has developed world wide as the first minimally invasive option to match success rate of open pyeloplasty [3]. Only one randomized study to compare Laparoscopic and open pyeloplasty has been done by Turk et al in 2002 [6]. We analyzed the comparison of Laparoscopic and open pyeloplasty in a randomized prospective trial.

Materials and Methods

A prospective randomized study was done from January 2004 to January 2007 in which a total of 28 Laparoscopic and 34 open pyeloplasty were done. All procedures were performed at our institute. The patients had radiographic evidence of UPJO on diuretic renography or hydronephrosis with delayed function on IVP in conjunction with signs and symptoms or deterioration of renal function. Out of the 28 patients for laparoscopy 25 presented with pain and 3 presented with recurrent urinary tract infection. 30 patients had pain in open pyeloplasty group while 3 presented with lump and one patient presented with hematuria after minor trauma. All patients underwent cystoscopy and RGP to confirm the diagnosis before the procedure. Ureteric catheter was left in situ.

All laparoscopic pyeloplasties were performed transperitoneally. Patients were placed in Lateral kidney position. 4–5 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. Anastomoses were done with 4–0 polyglactin. After completion of posterior layer DJ stent was placed and then anastomosis was completed. Drain was inserted adjacent to repair and Foleys catheter was left in bladder for two days. Drain was removed the next day if the drain output did not increase. Internal stent is removed after 4 week.

Standard open Anderson Hynes pyeloplasty, spiral flap or VY plasty was done depending on anatomic consideration. All laparoscopic cases were performed by a single surgeon dedicated to laparoscopy while open cases were performed by different surgeons expert in open surgery.

Patients were followed with DTPA scan at 3 months and IVP at 6 months. There after patients were followed at 6 months and then annually. The patients were radiologically investigated with DTPA scan depending on symptoms and signs.

Perioperative parameters including operative time, analgesic use, hospital stay, and complication and

success rates were compared. Post op patients received transdermal patch 100 or 200 mg (Diclofenac) according to severity of pain. Patients were assessed in post op period regarding pain according to the requirement of transdermal diclofenac patch (duration and quantity).

The Success was defined radiologically as a patent, unobstructed UPJ or improved or maintained renal functional status and symptomatic improvement. Formal chart review was completed with all Perioperative data completed and statistical analysis was done using Fisher exact test, unpaired t test and Mann–Whitney U test.

Results

The demographics of two groups were similar with regard to sex, age, laterality. None had any significant comorbid condition. The mean follow up in open cases was 33.5 months and in Laparoscopic cases was 34.5 months.

A total of 28 Laparoscopic pyeloplasties and 34 open pyeloplasties were performed (Table 1). Two patients in laparoscopic group had VY plasty due to high insertion of ureter and less dilated renal pelvis.

Mean total operative time with stent placement in LP group was 244.2 min (188–300 min) compared to 122 min (100–140 min) in open group. Total operative time did improve with experience for LP patients as average time reduced to 202 min for last five patients. There was no blood transfusion in any patient. There was no mortality in either group.

Compared to open pyeloplasty the post operative diclofenac requirement was significantly less in LP group (mean 107.14 mg) compared to open group mean (682.35 mg). The duration of analgesic requirement was also significantly less in LP group. The post operative hospital stay in LP was mean 8.29 days (7–11) and was significantly less than open group (mean 3.14 Days (2–7 days) (Table 2).

Table 1 Details of cases of pyeloplasty

Total cases	62
Laparoscopic pyeloplasty	28
Dismembered	26
VY plasty	2
Associated stone	2
Crossing vessel	4
Open pyeloplasty	34
Dismembered	31
VY plasty	2
Spiral flap	1
Associated stone	3
Crossing vessel	4

Table 2 Comparison of open and laparoscopic pyeloplasty

	Open	LP	P value
Age	29.58	31.64	N.S
Sex M/F	20/12	17/11	N.S
Side R/L	18/14	16/12	N.S
Operating time (min)	122.41+/-10.60	244.21+/-41.73	<0.01
Analgesic(mg)	682.35+/-123.66	107.14+/-73.00	<0.01
Duration analgesic (days)	3.41+/-0.61	1.00+/-0.67	<0.01
Hospital stay (days)	8.29+/-1.35	3.14+/-1.29	<0.01
Success	34/34	26/28	N.S

We had two cases of UPJO secondary to failed endopyelotomy which required operative duration of 300 minutes. Both patients had a successful outcome

There was only one conversion in laparoscopic group to open surgery as we were unable to remove associated calculus by laparoscopy. There was only one major complication in laparoscopic group. That patient had prolonged drainage of urine (6 days) through the drain which subsided with prolonged catheterization. He had recurrence of symptoms at 3 months and an obstructive DTPA curve. This was probably secondary to fibrosis caused by leakage of urine that occurred earlier. The patient was managed with endopyelotomy after 6 months. No patient in open group had recurrence

Discussion

The first successful reconstruction of an obstructed UPJO was accomplished in 1892 [7]. Since then open pyeloplasty has been the gold standard for UPJO repair and achieves success rates exceeding 90% in contemporary series [8–10]. In 1983 Wicham and Kellet described percutaneous pyelolysis (endopyelotomy) which subsequently gained some popularity [11]. Subsequent evolution in endoscopic physiology and application together with advances in endoscopic technology fostered advances in the field. Current approaches include antegrade percutaneous, retrograde ureteroscopic guided laser and retrograde acuse® balloon dilatation. The success rate of these minimally invasive options have consistently been less than with open pyeloplasty by 10–30% [12–14]. 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 peri-operative hemorrhage and 3–11% patients' required blood transfusion [15, 16].

Laparoscopic pyeloplasty provides a minimally invasive alternative to repair UPJO. Laparoscopic pyeloplasty was introduced in 1993 by Schussler et al. and has developed world wide as the first minimally option to match success

rate of open pyeloplasty [3]. Reconstruction of UPJO can be tailored to anatomical findings at the time of surgery [17]. The feasibility of Laparoscopic pyeloplasty including Anderson Hynes, fengers, Foleys VY plasty performed through transperitoneal and retroperitoneal approach has been evaluated [18]. Its potential advantages including less postoperative pain, shorter hospital stay and improved cosmesis have been proved in some comparative series [19–21]. The only disadvantage seems to be longer operative time in published series [19, 20]. However, Zhang et al (18) reported less operative time in Laparoscopic group (retroperitoneal) than open group. As laparoscopic surgery becomes more entrenched in resident training, the more complex skills such as intracorporeal suturing becomes less daunting. Moreover, long operative times may be reduced by skill of intracorporeal knotting and development of new robotic equipment [21]. The performance enhancing feature of da vinci robot seems to decrease the difficulty of intra corporeal suturing. In general the reported overall complications rate of laparoscopic pyeloplasty ranges from 4%–12.7% [18]. In the present study there was only one major complication and only one conversion to open surgery. This is possibly the result of the experience of the surgeon who did laparoscopic cases. Siguriea et al. [22] reported success rate in eight of nine patients with secondary PUJO while Sundaram [23] et al. (2003) reported 89% success rate in secondary procedure and a longer mean operating time of 6.3 h (2.7–10) In our series we had two secondary cases, operative duration of 300 min Both patients had a successful outcome. Ram Kumar et al. reported a series of 20 LPs with stone extraction through Laparoscope port. We had five patients with associated stone disease. Three were managed by open approach. One patient being managed laparoscopically had to be converted to open as stone could not be retrieved by laparoscopy. Zhang et al. [18] reported that analgesic requirement was significantly less in LP than open pyeloplasty. The duration and amount of analgesic requirement is significantly less than that in open pyeloplasty in our series. The success rate of laparoscopic pyeloplasty has been reported to be consistently high, at 87–98% [3]. In

present series we had a success rate of 92.3%. We considered conversion to open as a failure.

Conclusion

LP is a technically sound operation which uses well established principles familiar to urologist. The only disadvantage of Laparoscopic pyeloplasty is longer operative time and requires significant skill of intracorporeal knotting. This procedure has a minimal level of morbidity, short hospital stay, better cosmesis compared to open approach. Laparoscopic pyeloplasty has emerged as the standard of care and is here to stay.

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