Stentless pyeloplasty for ureteropelvic junction obstruction in children

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Introduction **Stenting after pyeloplasty is an established practice and helps in ensuring a patent anastomosis until healing has completed. Stents, however, may cause complications such as infection and displacement and increase the cost of management; therefore, stentless pyeloplasty is now considered as feasible alternative.**

Patients and methods **From August 2008 to October 2010, we retrospectively analyzed the results of stentless surgery in patients with ureteropelvic junction (UPJ) obstruction. In all, 42 patients with UPJ obstruction were managed. Nine patients who were treated conservatively, one who underwent nephrectomy, and one pyelostomy for pyonephrosis in solitary kidney were excluded. Age range at surgery was 14 days–12 years with a mean age of 12.7 months.**

Results **There were 23 male patients and eight female patients with a male-to-female ratio of 3 : 1. Fourteen patients had left, 12 right, and five had bilateral UPJ obstruction. A total of 34 pyeloplasties were performed in 31 patients. Of the five patients with bilateral UPJ obstruction, three underwent bilateral pyeloplasty and remaining two underwent unilateral pyeloplasty with conservative management on the opposite sides. Two patients underwent laparoscopic pyeloplasties and 32 pyeloplasties by open technique. Double J stent was placed at initial surgery in three patients and 31 stentless pyeloplasties were performed. The mean operative time was 75 min. The mean perinephric drain removal time was 2 days. None of the patients had persistent urinary leak. The mean hospital stay was 3.2 days. Reduction in anteroposterior diameter was noticed in 91% cases on 12 weeks follow-up scan. Complications included persistent or increase in hydronephrosis in three (9%) patients. In all the three patients, cystoscopic stenting was attempted. In two patients, size 4 Fr double J stent was passed easily into the renal pelvis. One patient improved, whereas other still has a dilated pelvis with static anteroposterior diameter after removal of stent at 6 weeks; patient is kept on close surveillance on regular ultrasonography. Re-exploration was performed in one patient, which showed kinking at the anastomosis site. Pyeloplasty was revised and patient improved. Other complications included lumbar hernia in one patient, which improved at 6-month follow-up, and stitch granuloma in one patient, which improved after removal of residual stitch.**

Conclusion **Stentless surgery for UPJ obstruction is a safe and feasible technique; it reduces the cost of surgery and avoids multiple procedures.** ***Ann Pediatr Surg*** **11:18–20 © 2015 Annals of Pediatric Surgery.**

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Introduction

Stenting has remained a standard practice for achieving optimal results of pyeloplasty [1]. Stents have the disadvantage of infections, displacements, breakage, and increased cost of surgery [1,2]. The fear with stentless pyeloplasty is anastomosis dehiscence, leakage, and higher incidence of stricture formation. It has been shown by various studies that the incidence of complications by stented and stentless pyeloplasty may be similar results [3,4]. Stentless pyeloplasty has the advantage of less hospital stay, avoidance of a second procedure, and decreased cost of surgery. Studies have proved the safety and efficacy of stentless pyeloplasty in open, laparoscopic, and robotic-assisted pyeloplasties [4,5]. We retrospectively reviewed our results of stentless pyeloplasty with a view to evaluate the safety, efficacy, and cost effectiveness of stentless pyeloplasty in children and to compare the incidence of complications and outcome of surgery with other published studies.

Patients and methods

From October 2008 to October 2010, we retrospectively reviewed patients who underwent stentless pyeloplasty for ureteropelvic junction (UPJ) obstruction. The purpose was to evaluate the safety, efficacy, and cost effectiveness of stentless pyeloplasty in children. All patients underwent ultrasonography (US) and MAG-III scan for preoperative and postoperative evaluation of UPJ. Patients were divided into mild, moderate, and severe category on the basis of anteroposterior (AP) diameter and split renal function. All patients having AP diameter of more than 20 mm and split renal function of less than 35% were operated. Patients having AP diameter of less than 15 and split function of more than 40 were placed on conservative treatment. Patients lying in the gray area were operated, if they had breakthrough infections or were symptomatic. Informed consent was taken from all patients regarding the procedure. Dismembered Anderson Hynes pyeloplasty was performed through posterolateral extraperitoneal approach. Two patients underwent laparoscopy-assisted pyeloplasty. Pyeloplasty was performed using 6/0 or 7/0 polydioxanone suture over a 5 or 6 Fr feeding tube, which was removed at the completion of anastomosis. Stents were placed in only three patients with very large pelvis. All other patients

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underwent stentless pyeloplasty. A perinephric drain was placed in all patients, which was removed when urinary drainage stopped. All patients had uretheral catheterization for 24 h. A follow-up ultrasound scan was performed at 6 weeks and 3 months. A cystoscopic double J stent was placed in patients after stentless pyeloplasty who had increase in AP diameter of renal pelvis after surgery at 3-month follow-up. One patient needed re-exploration with progressive hydronephrosis, as it was not possible to pass the double J stent cystoscopically.

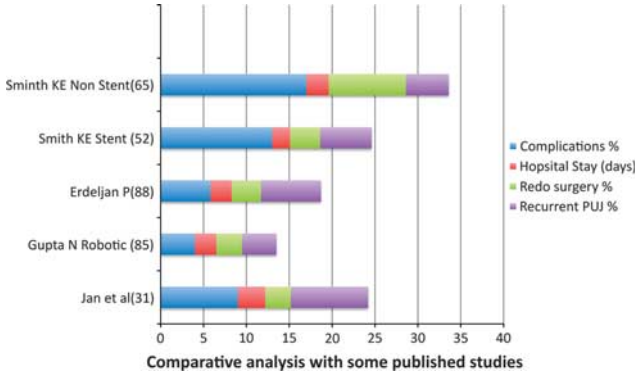
Results

A total of 42 patients were managed during this period. Of these, nine patients who were on conservative treatment, one who underwent nephrectomy for nonfunctioning kidney, and one who underwent nephrostomy for solitary kidney with UPJ obstruction and pyonephrosis were excluded from the study. Age range at surgery was 14 days–12 years with a mean age of 12.7 months. In all, 71% patients were below 1 year of age. There were 23 male patients and eight female patients with a male-to-female ratio of about 3 : 1. Fourteen patients had left, 12 right, and five had bilateral UPJ obstruction. Associated anomalies included posterior urethral valves in one patient. A total of 34 pyeloplasties were performed in 31 patients. Of the five patients with bilateral UPJ obstruction, three underwent bilateral pyeloplasties and remaining two underwent unilateral pyeloplasty with conservative management on the opposite sides. Two patients underwent laparoscopic-assisted pyeloplasty and 32 pyeloplasties by open technique. Double J stent was placed at initial surgery in three patients and were excluded. All other patients underwent stentless pyeloplasty (31 pyeloplasties). The mean operative time was 75 min. The mean perinephric drain removal time was 2 days. None of the patients had persistent urinary leak. The mean hospital stay was 3.2 days. Reduction in AP diameter was noticed in 91% cases on 12 weeks follow-up scan. Average preoperative AP diameter was 35.9 mm that reduced to 21.8 mm at follow-up. Complications included increase in hydronephrosis in three (9%) patients. Cystoscopic stenting was attempted in all three patients. In two patients, size 4 Fr double J stent was passed easily into the renal pelvis. One patient improved but the other still has a dilated pelvis with static AP diameter after removal of stent at 6 weeks; patient is kept on close surveillance on regular US. Re-exploration was performed in one patient, which showed kinking at the anastomosis site. Pyeloplasty was revised and patient improved. Other complications included lumbar hernia in one patient, which improved at 6-month follow-up, and stitch granuloma in one patient, which improved after removal of residual stitch. Cost of surgery to the patients for stentless and stented pyeloplasty was about 800 and 1300 dollars, respectively, in private setup. In the public hospital, it was much less due to the state sponsor of the patients.

Discussion

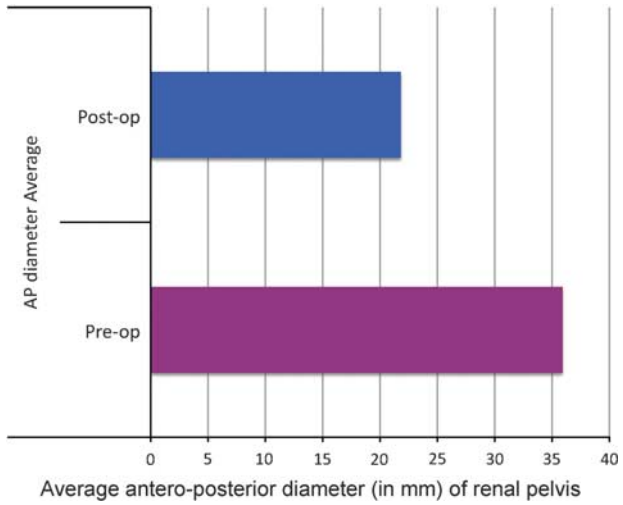
Stenting the anastomosis after pyeloplasty for UPJ obstruction has remained a standard procedure with excellent results [3]. Stenting keeps the anastomosis patent until healing has completed. It also minimizes the risk for leakage, obstruction, and adhesions after pyeloplasty. Various forms of stent have been used for this purpose, the most popular being double J stent that is usually removed through cystoscopy, 2–4 weeks after surgery [6]. Stents are also available for office removal such as feedings tubes, ureteric catheters, and purpose-built stents such as kidney internal splintage stent [7]. Although the stents help in achieving the results of a good pelviureteric anastomosis, they have some disadvantages such as cost of stent, removal under anesthesia, and complications such as infection, displacement, breakage, stone formation, prolapse, etc. [4,8]. With the improvement in the surgical techniques and the availability of better suture material, the previously feared complications of stentless pyeloplasty, such as stricture, leakage, urinoma formation, adhesions, and recurrence, can now be avoided in most cases. We compared our results with other studies for parameters of hospital stay, recurrence, complications, and redo-surgery [2,9,10]. It can be seen that incidence of complications is comparable with other studies where stents were used after pyeloplasty (Fig. 1). The use of stents may result in more secondary procedures than stentless pyeloplasty [2]. Urinary leakage is a significant concern in patients who undergo stentless pyeloplasty. None of our patients had a persistent leak after stentless pyeloplasty. The key in achieving these results is to preserve the vascularity of the ureter and the renal pelvis. This can be achieved by keeping the adventitia along with the ureter and the renal pelvis intact. The other important factor is meticulous spatulated anastomosis with fine sutures avoiding thick bites. A comparative analysis of the preoperative and postoperative AP diameter suggests significant decrease in AP diameter that is comparable with other studies (Fig. 2) [2,3,5,9]. We did encounter problems in few patients. Some degree of residual hydronephrosis is seen in most patients even after successful surgery [11]. It takes many years before the hydronephrosis is settled on US scan. Increase in AP diameter of the ureters is, however, indicator of obstruction. Three of our patients had this problem (9% of all pyeloplasties), which is slightly higher than other studies [8,9]. Placement of stent decreased the severity of hydronephrosis in one of the two patients. We feel that the persistent hydronephrosis without anatomical obstruction

Fig. 1



Comparative analysis with some published studies.

Fig. 2



Average anteroposterior (AP) diameter (in mm) of renal pelvis.

is secondary to incoordination between the renal pelvis and ureter. Some of these patients improve with the passage of time; however, a close surveillance with US studies shall be performed to prevent renal damage. In one patient in whom it was not possible to negotiate the double J stent through the UPJ, exploration revealed that he had kinking at the site of anastomosis. This may be one reason why a stent may be placed after pyeloplasty.

Cost of surgery is an important consideration in the developing countries [12]. The single most important advantage of stentless pyeloplasty is decreased cost of surgery. The cost of stent and removal of stent may be a significant burden for poor patients and can be avoided in most patients. The outcome of surgery, however, may be different according to the severity of hydronephrosis. In cases of very large renal pelvis, where major excision of the redundant pelvis is performed, we were not comfortable without placing a double J stent. Therefore, stents were placed in three patients after pyeloplasty. All these patients had uneventful resolution of hydronephrosis.

Conclusion

It can therefore be concluded that stentless pyeloplasty is a feasible, cost-effective, and reliable technique for pyeloplasty in children. Secondary surgical procedures may be needed in few patients irrespective of the surgical procedure adopted.

Acknowledgements

Conflicts of interest

There are no conflicts of interest.

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