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IS LAPAROSCOPY REALLY USEFUL IN LIVING DONOR NEPHRECTOMY ? A COMPARATIVE STUDY OF MINI OPEN DONOR NEPHRECTOMY VS LAPAROSCOPIC DONOR NEPHRECTOMY.

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ABSTRACT

Introduction: Laparoscopic donor nephrectomy is the standard of care at many renal transplant centres, with benefits over the open approach well-documented in the literature. However attractive as it may seem, the procedure is associated with a definite learning curve and does compromise donor safety. The procedure is also expensive . The mini-donor nephrectomy is an excellent alternative, has no learning curve and is ideally suited for donors in India who have a low BMI.

Here in, we present a retrospective analysis of our single-institution donor nephrectomy series comparing the mini-open donor nephrectomy (mini-ODN) to the laparoscopic donor nephrectomy (LDN) with regards to operative, donor, and recipient outcomes.

Methods: From January 2014 January 2017, In total, 67 patients were reviewed, there were 35 cases of mini-ODN, 32 cases were LDN . Both the groups were reviewed in terms of operative time , warm ischemia time, vessel lengths, postoperative donor recovery, recipient graft outcomes for comparing the surgical approaches.

Results: There were significant differences in favour of mini-ODN regarding operative time, warm ischemia time, and vessel lengths, whereas the analgesic requirements and pain data were significantly in favour of the laparoscopic procedure.

Conclusions: These results from our study suggests mini-ODN is a very secure procedure, superior to LDN regarding donor safety. The high costs and the training required for laparoscopy have been major deterrents to its widespread use in India.

KEYWORDS : mini-open donor nephrectomy (mini-ODN), operative time,warm ischemia time, donor safety

INTRODUCTION :

End-stage renal disease (ESRD) is a prominent and growing concern in Indian healthcare. Treatment of ESRD is very costly, with cost of hemodialysis is increasing and out of reach for many patients in India . The gold standard treatment for ESRD is renal transplantation. Living donor nephrectomy was first introduced 50 years ago.(1). Since then, numerous studies have shown superior outcomes over deceased donor nephrectomy with regards to long-term patient and graft survival.(2). A number of surgical techniques have been developed to minimize morbidity for donors, while maintaining optimal function of transplanted kidneys for recipients.

Laparoscopic donor nephrectomy (LDN) was first performed in 1995.(3).Today, it has grown to represent approximately 80% of donor nephrectomies and has become the standard of practice in most institutions. (4). This technique is favoured over traditional open donor nephrectomies (ODN), as it offers many benefits, including less intraoperative blood loss, reduced hospital length of stay (LOS), less postoperative pain, shorter period of convalescence, decreased morbidity, better cosmesis, similar allograft outcomes, and increased living kidney donation rates.(5-8)

In keeping with the well-documented benefits of minimally invasive surgery, the majority of institutions have made the transition from ODN to LDN. However, many institutions continue to offer the ODN technique in the form of a mini-flank incision thought to have many advantages over the standard flank incision for ODN.

The **mini-open donor nephrectomy (mini-ODN)** technique offers a decreased LOS, less postoperative pain, and shorter return to work when compared to the standard open technique.(9) Although the laparoscopic procedure has gained widespread acceptance over the last few years (10,11). On the basis of a meta-analysis, an Australian safety group concluded (12) that the evidence base for LDN was inadequate to make recommendations regarding safety and efficacy

MATERIALS AND METHODS :

Donors fulfilling existing criteria for selection with a single, left renal artery and intended to donate the left kidney were considered eligible for our prospective, randomized study. There was no further selection. From January 2014 to January 2017, 32 donors were randomized to receive LDN, and the mini ODN was done in 35 cases. All 67 donors underwent surgery according to the randomization, and no one was excluded from follow-up.

Surgical Techniques :

All LDNs have been performed in the flank position. Pneumoperitoneum was created by veress needle introduction . The intraperitoneal pressure was maintained at the 10 to 12 mm Hg level. The access has been transperitoneal, using 4 to 5 ports (10mm) and 30° telescope . Dissection was mainly carried out by means of a 10mm harmonic knife .The branches of the renal vein were exposed using a Kelly dissector and divided between hem -o lock clips . The renal artery was divided by scissors after application of two hemo -o-lock clips toward the aortic wall, similarly renal vein was clipped and cut with the scissors. Ureter was clamped with clips and cut at the level of crossing of iliac vessels .

LDNs were completed by conventional technique using a plastic specimen bag for kidney extraction through a pfanensteil incision. Fascial defects at port sites (10 mm) were closed with delayed absorbable suture, port site skin was closed with skin staplers All LDN were done by a single experienced surgeon .

The mini ODNs were performed by mini supra costal incision (above 12th rib) , without the resection of any rib, retroperitoneal access was gained through 11th intercostal space , i.e. in between 11th and 12th ribs. Renal vessels are dissected and the branches of the renal vein were ligated & cut, and renal vein is ligated with silk and clipped and cut.The renal artery was divided by scissors after application of silk suture and two clips toward the aortic wall. Ureter was clamped with clips and cut at the level of crossing of iliac vessels .

Data Collection :

Operative time was defined as time elapsed from skin incision to placement of the final skin suture. Warm ischemia time was defined as time elapsed from clamping of the renal artery to initiation of cold perfusion (EuroCollins solution; 0–4°C). Length of renal artery and vein was measured to the edge of the parenchyma in the hilus, without stretching. Length of the ureter was measured to the ureteropelvic junction. Narcotic analgesic requirements (postoperative days 1 and 2)

were reported using parenteral morphine equivalents. Pain intensity at rest and in motion was recorded using a categorical scale (0–4). Stay in hospital was counted in whole days from the day of donation to the day of discharge.

Perioperative incidents, postoperative complications, reoperations, and recipient incidents were concurrently recorded in our database. The follow-up was greater than 6 months for all donors and recipients.

Data are presented as mean and range, and statistical analysis has been performed with Student's *t* test. A *P* value of less than 0.05 is considered statistically significant. Statistical inferences have not been considered meaningful for the comparison of surgical complications/frequencies.

RESULTS :

Data from our prospective, randomised LDN study is summarized in Tables 1 and 2.

The two groups were comparable with regard to baseline characteristics: age, gender, BMI, and relation to recipient (Table 1).

TABLE 1. Baseline data

Baseline data, mean (range)	Open LDN (n=35)	Laparoscopic LDN (n=32)
Age	44(32-65)	46(30-65)
Gender(Male: Female)	30:5	26:6
BMI	25.7(19.5-32.0)	24.6(19.1-32.9)

Donor and Recipient outcome is shown in Table 2.There were significant differences in favour of mini-ODN regarding operative time, warm ischemia time, and vessel lengths. The stays in hospital were similar among the two groups, whereas the analgesic requirements and pain in motion (during postoperative days 1 and 2) were significantly in favour of the laparoscopic procedure. Regarding graft/ recipient outcome, there were no cases of delayed graft function or early graft loss in either group.

TABLE 2. Donor and Recipient outcome

Results, mean (range)	Mini-ODN	LDN	Student's t test p value
Operative time (min)	140* (95–223)	180 (110–295)	0.01
Warm ischemia time (min)	1.4* (0.9–3.2)	4.3 (2.1–11)	0.01
Vessel lengths Artery (mm) Vein (mm)	31* (20–60) 35* (18–60)	27 (15–45) 32 (20–42)	0.01 0.01
Hospitalization (days)	6.7 (4–12)	6.2 (3–14)	n.s.
Analgesic requirements Postop. days 0+1 (morphine equiv.; mg)	36.4 (5–98)	28.1* (0–77) 0.016 27.5	0.022
Pain intensity at rest (scale 0–4)	0.51 (0–2)	0.37 (0–2)	n.s.
Pain intensity in motion postop. days 0+1 (scale 0–4)	1.50 (0–3)	1.21 (0–3)	0.014
Recipient/graft	No thrombosis or early graft loss	No thrombosis or early graft loss	

In the mini-ODN group, there were no major complications and no reoperations. However, three donors developed superficial wound infections (*Staphylococcus aureus*), which were treated conservatively with appropriate antibiotics depending upon culture & sensitivity report. In LDN group there were no major complications and no reoperations. Furthermore, there have not been any cases of thrombosis or early graft loss in either group.

DISCUSSION :

Mini-ODN appears to be clearly superior with regard to operative time, warm ischemia time, and vessel lengths (Table 2). There has been a tendency toward shorter LDN operative time with progression of the series Recipient graft function has been satisfactory in all recipients, despite, at most, 11 minutes of warm ischemia.

Short renal veins have not caused any major technical difficulties during transplantation, and there have not been any cases of graft thrombosis. Our data, similar to most other series (10,13), show LDN superiority regarding postoperative pain, at significant levels. Furthermore, a better cosmetic result is definitely achieved with LDN. The data on hospital stay is not informative because the donors were allowed to stay 1 week to follow their fellow recipients according to the tradition at our centre.

In the Mini-ODN group, no major complications occurred. This confirms our apprehension that Mini- ODN by small supra costal flank incision is a very familiar and safe procedure at our centre and is hard to compete with. The results from our randomized study do indeed suggest that conventional Mini-ODN is superior to LDN with regard to donor safety.

Growing concern about donor safety has recently been raised. During the introduction of a new and exciting technique such as LDN, there may be a tendency toward reporting “nice” data while retrenching unsuitable data. In a study by Shaffer *et al*.(14) of 201consecutive donors, bleeding was encountered in one patient, pneumo-thorax in two, wound infection in two and pneumonia in two. Only one patient developed an incisional hernia. Complications in laparoscopic donor nephrectomy are serious. Retroperitoneal hematoma was encountered in four patients, splenic injury in two patients, bowel injury in three patients and renal vein tear in one patient. Six patients required a blood transfusion.

In India, cadaver organ donation accounts for an insignificant number of renal donations. Majority of donations are from live donors. These are either related in the vast majority of cases or authorized as per the Human Organ Transplant Act. The commonest donor is usually the female sex and is usually the mother, wife or sister. Most of these donations are to bread winners of the family to whom the entire economic survival of the family is linked to. Also, vast majority of these donors are unemployed. For them, the most important factor is the quality of organ harvested and the quality of life that recipient enjoys to make him the bread winner again.

These reports, as well as our results from the present randomized trial, brings us to conclude that the laparoscopic procedure should be introduced with great caution, attaching importance to laparoscopic skills and experience. A simple consideration would indeed support the idea that an open field with complete access is superior to a closed field with limited and distant access. However, it should be kept in mind that the laparoscopic procedure is still evolving, technically and regarding equipment. Our data support the conclusion that a perfect, uncomplicated Mini-ODN appears to be the superior procedure.

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