East African Medical Journal Vol. 93 No. 4 April 2016
LAPAROSCOPIC MYOMECTOMY IN KENYA : A 15 YEAR RETROSPECTIVE REVIEW
R. B. Parkar, MBChB, MMed, Associate Professor, Consultant, Obstetrician and Gynaecologist, P. O. Box 520, Sarit Centre, 00606, Nairobi, Kenya, J. Wanyoike-Gichuhi, MBChB, MMed, Senior Lecturer, Department of Obstetric and Gynaecology, College of Health Sciencies, University of Nairobi, P. O. Box 333, 00202, Nairobi, Y. Patel, MBChB, MMed, Consultant Obstetrician and Gynaecologist, P. O. Box 38121 - 00623, Nairobi, Kenya and D. Otieno, MBChB, MMed, Consultant Anaesthetist, P. O. Box 19990 - 002002, Nairobi, Kenya

Request for reprints to: Prof. R. B. Parkar, Associate Professor, Obstetrics and Gynaecology, University of Cape Town, Consultant, Obstetrician and Gynaecologist, P. O. Box 520, Sarit Centre, 00606, Nairobi, Kenya

LAPAROSCOPIC MYOMECTOMY IN KENYA : A 15 YEAR RETROSPECTIVE REVIEW

R. B. PARKAR, J. WANYOIKE-GICHUHI, Y. PATEL and D. OTIENO

ABSTRACT

***Objectives*: To evaluate the indications,operative techniques, outcomes, limitations and fertility outcomes following laparoscopic myomectomy.**
***Design*: Retrospective case analysis**
***Setting*: Various Private Hospitals in Kenya**
***Subjects*: One thousand and forty three patients who underwent laparoscopic myomectomy**
***Results*: The main indications for laparoscopic myomectomy in our review were Menorrhagia (52.1%), Primary Infertility (22.6 %), Secondary Infertility (14.3 %), Abdominal pain (8.2 %) and pressure symptoms (2.8 %). The dominant myomas that were removed were intramural (45.4 %), subserous (34.6 %) and sub-mucous (19.9 %) of the cases respectively.**
***Conclusions*: Laparoscopic Myomectomy can be performed safely and effectively by adequately trained and skilled Surgeons and offers all the advantages of laparoscopic surgery including less haemorrhage, quicker recovery and return to work. The clinical outcomes are good and there were no major complications. The fertility outcomes are comparable to open myomectomy with better outcomes for sub mucous fibroids and deep intra-mural fibroids indenting the uterine cavity.**

INTRODUCTION

Uterine fibroids are the most common benign neoplasms of the female genitalia tract, occurring in up to 50% of women in their reproductive age (1). Traditionally the interventional criteria for the surgical management of uterine fibroids are infertility, recurrent spontaneous abortions, abnormal contour of the abdominal wall, abdominopelvic pain, abnormal uterine bleeding, menorrhagia, and in women who reject hysterectomy (2). Semm first described Laparoscopic Myomectomy in the late 1970's, and there has been much skepticism on the role of procedure as a treatment option in symptomatic fibroids (3,4). However, laparoscopic myomectomy has gained tremendous acceptance worldwide and is now recommended as the best treatment option for symptomatic women especially if fertility is to be maintained (5,6).

Compared with laparotomy, laparoscopic myomectomy is considered a valid alternative and has the advantages of smaller incisions, relatively less intra-operative blood loss, shorter hospital stays, less post-operative adhesion formation, increased fertility outcomes and good assessment of other abdominal organs (7,8). In addition, several randomised controlled trials have demonstrated these advantages (9,10,11).

The criteria consisting adequate selection of patients for laparoscopic myomectomy are still a matter of great debate. Dubuisson J. *et al* considered the limit of three myomas with a maximum diameter of eight centimetre or a uterine size corresponding to 16 weeks gestation and the absence of any significant adenomyosis as a generally accepted rule (12).

In their review they also recommended that any dissection should be performed without breeching the endometrial cavity. Nezhat *et al* in their series 0f 137 women 197 fibroids were harvested, varying from 2 to 14 cos in size, with an operating time of 50 to 160 mins.They concluded that the large intramural fibroids should only be managed laparoscopically if the Surgeon is capable of a meticulous repair of the uterus (13). Sinha *et al* in their series of 505 healthy

non pregnant women with symptomatic fibroids under going laparoscopic myomectomy concluded that laparoscopic myomectomy can be performed effectively by experienced surgeons regardless of size, number or location of the fibroids, having successfully undertaken the laparoscopic removal of multiple large fibroids with a cumulative weight of 2.3 kilograms (14, 15). Agdi concluded that Laparoscopic Myomectomy is the best option treating symptomatic uterine fibroids in women desiring to retain their fertility (16) .

Miller reported that laparoscopic myomectomy was associated with a lower risk of post-operative adhesion formation,reduced intra-operative bleeding, decreased post-operative febrile morbidity, lower reduction in post-operative haemoglobin levels, shorter hospital stays and improved pregnancy rates (17). However Serrachioli *et al* in their random review of 131 patients in their reproductive age desiring fertility with a dominant fibroid of greater than 5 centimetres, concluded that no significant difference in pregnancy rates and fertility outcomes were observed between the abdominal myomectomy group (55.9 %) and the Laparoscopic group (53.6 %) (18). Metwally *et al* in a Cochrane review of three studies with 474 participants concluded that there was no significant benefit between open and laparoscopic myomectomy and fertility outcomes (19). It is against this difference of opinion the we highlight our experience and outcomes of laparoscopic myomectomy over the last 15 years.

In Kenya, laparoscopic myomectomy is now being readily accepted by patients and Gynaecologists as an alternative modality to laparotomy. It is with this background that we present 15 years experience (2000 - 2015) on laparoscopic myomectomy at various Private Hospitals in Kenya. The principal author performed 1448 Myomectomies in 15 years and the outcomes of 1043 laparoscopic myomectomies (72.03 %) are discussed. The different sizes, location and number of fibroids removed during surgery, complications and challenges encountered are reported. The objective of this study is to evaluate our operative technique, post-operative course, follow up and pregnancy outcomes of women who underwent laparoscopic myomectomy at various Hospitals in Kenya. The limitations of our technique will also be discussed.

MATERIALS AND METHODS

A retrospective case analysis of all laparoscopic myomectomies done at various Hospitals in Kenya between May 2000 and December, 2015 was conducted.

The inclusion criteria were all patients whose records were complete and follow up was regular. No exclusion criteria based on size, number or location of the myomas previous scars, obesity or underlying co – morbid pathology was considered and all women with symptomatic myomas who desired fertility or preferred to retain their uteri and opted for laparoscopic myomectomy were included in the study. Pre-operatively they all underwent an anaesthetic review, and routine investigations. All patients underwent either a transvaginal and or an abdominal ultrasound examination before surgery. The size and location, position and number of myomas were evaluated and recorded (Fibroid mapping).

Standard Laparoscopic towers consisting of monitors, a Camera, a light source, an electronic endoflator, a high frequency diathermy unit, and an aquapurator were used for all the cases. Morcellation was achieved by a Karl Storz new generation Rotocut.

Operative technique and placement of ports: In Theatre, under general anaesthesia, patients were placed in an extended lithotomy position, cleaned and draped. Aseptic catheterisation was undertaken routinely, and an examination under anaesthesia performed to determine, uterine size, position, mobility and the presence or absence of any adnexial pathology.

The procedure of Laparoscopic entry for all the cases was standard. An initial pneumoperitoneum was created via a Verres needle through a primary vertical stab incision at a site determined by the size of the uterine fibroids. The veress needle is placed either at the umbilicus or Lee Huang's point depending on the size of the dominant fibroid. Occasionally a direct trochar entry was preferred. The initial CO^2 insufflation pressure was maintained at 25mmHg and the flow rate of one litre per minute. Once an adequate and a tense abdominal distention was obtained, a 10mm Trocar was inserted through the primary port. A 30^o, 10mm laparoscope was then inserted, and subsequently the intra-abdominal pressure was reduced and maintained at 15mm Hg and the flow rate increased to maximum.

In our technique we consider Port geometry extremely important for efficient surgery, good ergonomics and intra-corrporeal suturing especially in the case of large and multiple myomas. We used two to three, five milimetres accessory ports, 1 each in the left and right lateral lower quadrants, and a third left paraumbilical port if required. All secondary ports are inserted strictly under vision and should ideally be above the upper limit of the uterus (dominant fibroid) so as to ensure an unobstructed passage above the fundus of the uterus. The left lateral 5 – mm port was converted routinely to a 15 – mm port for the insertion of the morcellator. Initially the upper abdomen, the mid abdomen and the pelvis were scanned and inspected, for any underlying co-morbid pathology. Any adhesions were released by sharp dissection, the harmonic scalpel or Thunderbeat.

Diagnostic Hysteroscopy was performed

routinely in all patients so as to rule out any co-existing intra-uterine pathology. Hysteroscopic myomectomy was performed in all patients with sub-mucosal myomas less than four centimetres in the largest diameter. We prefer to use 10mm 30 degree forward oblique telescope for all our Hysteroscopic myomectomies to ensure good visualisation of the myomas from various angles. Significant intrauterine pathology either endometrial polyps or submuous fibroids were encountered in 239 (22.91 %) of the 1043 patients.

The technique of myomectomy for all cases was standard. Appropriate manipulation of the uterus with means of a suitable uterine manipulator or the myoma spiral was of paramount importance. However, we noted that once the myoma spiral is inserted into the myoma, manipulation becomes much easier. Vasopressin (5 ml) diluted in 100ml of saline solution was infiltrated at a single point beneath the pseudocapsule of all the dominant fibroids. Multiple injections were avoided so as to maintain a good tamponade effect. This was followed by injecting up to 400 to 600 mls of normal saline so as to achieve adequate blanching and aquadisection. Uterine incisions were made close to the apex or most prominent convex surface of the dominant myoma, using either the Monopolar hook electrode, Harmonic scapel or Thunderbeat .

The cleavage plane between the myoma and its pseudo-capsule was then dissected bluntly and enucleation of the myoma is completed with the help of traction and counter traction.Rotation of the fibroid from below upwards within its bed encouraged easier removal. In our technique we prefer to slide all myometrial fibres off the fibroids ,not using any sharp dissection since this enables the muscle fibres to significantly entrap the myometrial blood vessels hence reducing the overall blood loss during the procedure.The Hysterotomy was closed with either interrupted intra-corrporeal sutures with 1 – 0 vicryl on a cutting needle in 1, 2, or 3 layers (multilayered closure) depending on the depth of the defect in the uterine wall using vertical mattress sutures or figure of " 8 " sutures and more recently using barbed sutures. The use of the fish bone or baseball stitch was encouraged on the serosal surface to limit post operative adhesion formation. The endometrium was excluded in the suture line if the uterine cavity was breeched. Haemostasis is ensured with the sparing use of bipolar coagulation. The myomas are then removed by use of an electro-mechanical morcellator, through an extended left port, a "Minilap" or a colpotomy depending on the size and number of the fibroids. Three tablets of Cytotec were routinely inserted rectally so as to maintain a well contracted uterus.

No patient included in the study underwent pre-operative hormonal therapy or received any pre-operative blood transfusions. Blood was cross – matched for post-operative use if required. The patients were kept on a liquid diet for 2 days before procedure to ensure that the bowel loops would be empty at the time of the procedure. Bowel preparation was not routinely undertaken . Antithromboembolic prophylaxis measures adopted included low molecular weight heparin sub-cutaneous injection and sequential compression devices. All patients were administered intra-venous anti-biotic prophylaxis. All data were stored and retrieved from an Apple Mac Book Pro.

RESULTS

The principal author performed 1448 Myomectomies harvesting 2077 fibroids during the reporting period and the outcomes of 1043 laparoscopic myomectomies (72.03 %) are discussed. Figure 1 depicts the trend of laparoscopic myomectomies undertaken in our series. Initially we were extremely selective on the cases that were attempted. Since 2012 our improved expertise and suturing techniques enabled us to undertake more challenging, difficult, larger and multiple fibroids with good results. The increased numbers also reflect the growing confidence of patients in our results and outcomes. The mean patient age was 34.36 and the mean patient weight was 54.96 kgs. The main indications for surgery were abnormal uterine bleeding (543 patients), primary infertility (237 patients), secondary infertility (149 patients), abdominal pain (85 patients) and abdominal mass with pressure symptoms (29 patients) (Table 1). The location pf the myomas (dominant fibroid) varied and was in the fundal position in 383 cases, 836 were in the anterior position, 286 were in the posterior position, 261 were in the lateral position, 113 were in the anterior cervical position, and 96 were in the posterior cervical position. In all, 102 myomas were pedunculated. The dominant fibroid on the pre-operative ultrasound was intra-mural in 474 cases (45.5 %), subserous in 361 (34.6 % %) and in 208 (19.9 %) they were sub-mucosal (Table 2). Hysteroscopic myomectomy was performed in the 199 (19.0 %) patients who had a concomitant sub-mucosal myoma. In nine patients the largest diameter of the sub-mucosal myoma was more than 6 centimetres and hence they were removed laparoscopically and not by hysteroscopic myomectomy. The number of myomas removed ranged from 2 to 17. The sizes of the myomas (on the pre-operative ultra-sounds) removed laparoscopically varied from 2 centimetres to 26.4 centimetres in diameter, 144 patients had one myoma beyond 8 centimetres in size, 11 had 2 myomas beyond 8 centimetres in size and 1 patient has 3 myomas beyond 8 centimetres in size. The weight of the myoma removed ranged from 20 to 2920 grams, the mean weight of the myomas removed being 460g. The mean operating time was 60 minutes with a range of 30 – 270 minutes. The median blood loss

was 90ml (range 40 – 2000 ml), 21 patients (2.01%) requiring post-operative blood transfusion. The uterine cavity was breeched in 135 cases (12.9 %). In 11 cases (1.05%) the laparoscopic procedure was abandoned and the procedure completed through a Minilaparotomy or a formal Laparotomy due to excessive bleeding, technical issues and more than the anticipated number of fibroids (Table 3). Redo laparoscopic myomectomies were performed within 12 months in 9 patients (0.86 %).

Table 1
Indications for Laparoscopic Myomectomy

Indications	Number	Percentage
Menorrhagia	543	52.7 %
Primary Infertility	237	22.6%
Secondary Infertility	149	14.3%
Abdominal pain	85	8.2%
Abdominal mass / Pressure symptoms	29	2.8%

Table 2
Types of Myomas (Dominant Fibroid on preoperative ultrasounds)

Type	Number	Percentage
Intramural	474	45.4%
Subserous	361	34.6%
Submucous	208	19.9%

Table 3
Surgical outcomes

	Number	Percentage
Successful Laparoscopic Myomectomy	1032	98.95%
Conversion to Laparotomy	11	1.05%

The fertility outcomes following laparoscopic myomectomy are highlighted in Table 4. The duration between surgery and conception ranged from six weeks to 18 months and averaged 11 months. Overall 726 patients (69.6 %) achieved a total of 1129 pregnancies of these 229(21.9 %) and 161(15.4 %) patients achieved a second and third pregnancy subsequently. There were 47(4.5 %) spontaneous abortions, 19 patients delivered vaginally (1.82 %) the rest delivering either by an Elective or Emergency Caesarian Section. There were no cases of dehiscence or uterine rupture in our series.

The fibroids were retrieved either directly through an extended left iliac port, through a Minilap, a Colpotomy or Morcellation through the left port. In our review fertility outcomes were 24 % following removal of Subserous fibroids, 37.9 % in cases of Intramural fibroids and 66.3 % in cases of Sub-mucous fibroids. Hospital stays varied from discharge on the same day (563 patients : 59.9 %) to three days.One patient who underwent a Laparotomy for 27 fibroids (incidental finding on scope insertion) was discharged on day six. After discharge, all the patients were seen on the 7th post operative day, after one, three and six months.

DISCUSSION

Laparoscopic myomectomy is only appropriate when indications for surgery have been met. The common symptoms that lead women to seek surgery for fibroids include pelvic pain, pressure symptoms abnormal uterine bleeding and compromised fertility (20). Myomas may also compress adjacent structures causing urinary frequency or urgency, constipation or dyspareunia or poor reproductive outcomes. Despite the method of surgery selected there must be an absolute indication for surgery. For women in the reproductive age wanting to preserve fertility, myomectomy still remains the gold standard (20). It is widely accepted that laparoscopic myomectomy has many advantages as compared to laparotomy: hospital stay is shortened and post-operative pain is significantly reduced (21). Laparoscopic myomectomy may also reduce the risk of post-operative adhesions which is an advantage in young patients, especially in the context of infertility.Several studies have shown that the risk of peritubal and peri-ovarian adhesions following a laparoscopic procedure are significantly less (22).In our series we had the opportunity of second look Laparoscopies on nine patients for recurrent fibroids within 12 months after the initial procedure.The incidence of peritubal and periovarian adhesions were considerably less. Despite these advantages there is varying opinion regarding the feasibility of myomectomy in patients with multiple or large fibroids, with size location and number of myomas seen as the main limiting factors . Selection based on the uterine size equal to or less than 14 weeks ; individual myomas less than 7 cm; absence of myomas near the uterine artery or near the tubal ostia if fertility is desired; and at least 50% of the myomas subserosal has been suggested in numerous publications (23, 24, 25). We found that there were no limiting factors for size,location and number of myoma's, our largest fibroid successfully removed was 26.4 cos on the preoperative ultrasound (weighing 2920 grams) and in our series the largest number of fibroids removed from a single patient was 17. The experience of the Surgeon is regarded as a strong determinant for a successful Laparoscopic Myomectomy (23, 24, 25, 26, 27). Our initial case load of laparoscopic myomectomy was restricted to single , small (4 to 6 cms) on the anterior or fundal surface of the uterus. Over time as we performed more procedures we undertook to attempt more challenging cases including larger, numerous fibroids on the posterior or lateral uterine walls. Along with improved suturing techniques our results continued to improve. In our opinion experience of the Surgeon

may be regarded as the single most crucial factor for a successful laparoscopic myomectomy. Most of the problems cited to be associated with laparoscopic myomectomy include poor haemostasis, inadequate closure, incomplete removal of all the fibroids and technical difficulties. These problems are genuine and should be anticipated by any laparoscopic surgeon regardless of the level of experience. However, with slight modifications these problems can be overcome. Some of these modifications include the placement of the entry ports differently. The use of a supraumbilical port or alternatively the Lee Huang's or Palmer's point for the primary port may occasionally be an advantage. This gives a better panoramic view and allows adequate suturing with less interference from the camera. Over the years we have modified our technique of delivering the myoma's from their bed. In our technique the cleavage plane between the myoma and its pseudo-capsule is dissected bluntly and enucleation of the myoma is completed with the help of traction and counter traction. Rotation of the fibroid from below upwards within its bed encouraged easier removal. We prefer to slide all myometrial fibres off the fibroids ,not using any sharp dissection since this enables the muscle fibres to significantly entrap the surrounding myometrial blood vessels hence reducing the overall blood loss during the procedure. The technique of enucleation of the fibroid from its pseudo-capsule could also determine the level of difficulty and amount of blood loss one encounters.

The use of GnRH analogues prior to myomectomy has received varying opinion. Other than the aforementioned disadvantages GnRH agonists also tend make the identification of cleavage plane more difficult and results in lengthening of the procedure (28,29).The reduction in size achieved by these drugs also makes the identification of small fibroids difficult which increases the probability of further surgical interventions . GnRH analogues are notorious for encouraging fibroid degenerations making them softer and more "sticky" thereby increasing the difficulty of the myomectomy (30). In our series we did not encourage the use of GnRH analogues pre-operatively in patients who desired future fertility.

Another major concern with laparoscopic myomectomy has been the suturing technique. It is now possible to perform a two layer closure of the uterine defect achieving good apposition and haemostasis. For an experienced laparoscopic surgeon skilled in endoscopic suturing, achieving good uterine closure is possible despite the site, size and number of fibroids. To minimise the risk of a weak uterine scar, extensive use of thermal energy for hemostasis should be avoided as this has could lead to poor vascularisation and tissue necrosis with an increased risk of fistula formation (31, 32). Our suturing techniques varied depending on the size , location and number of fibroids. Good apposition and haemostats was of paramount importance. In our series vertical mattress suturing or a multilayered closure with a vicryl no 2/0 was the norm. Occasionally barbed sutures were used.

In our opinion it is imperative to occlude any "dead space" failure of which will allow for a haematoma collection, subsequent infection and a poor scar formation increasing the possibility of a scar dehiscence during any future pregnancy.

The debate regarding the advantage of laparoscopic surgery on fertility outcomes is so varied. Malzonni *et al* reported an intrauterine pregnancy rate of 62.5% in their experience of 982 Laparoscopic myomectomies performed by three surgeons at two dedicated centres (24). Desolle *et al* in their review of 103 women with uterine fibroids and infertility of more than two years undergoing a laparoscopic myomectomy achieved a pregnancy rate of 40.7 % in 88 patients and concluded that feasible outcomes after laparoscopic myomectomy were primarily dependant on the patients age, duration of infertility and the existence of associated factors and not related to the fibroid characteristics (33). Palomba *et al* in a randomised controlled trial comparing myomectomy by laparoscopy (n = 68) and minilaparotomy (n = 68) concluded that the live birth rate per cycle were significantly higher ($p < 0.05$),cumulative pregnancy rates were 52.9 % (38.2 % in the Minilaparotomy arm) , time to the first pregnancy was significantly lower ($p < 0.01$) and a higher recurrent pregnancy rate ($p = 0.025$) in the laparoscopic myomectomy arm (33). Several authors have suggested that the location of the fibroids influence fertility. Pritt *et al* and Brady *et al* in their literature reviews and meta analysis of controlled studies concluded that although sub-serous fibroids had no influence on fertility outcomes, intra-mural fibroids decreased fertility and increased pregnancy losses,while sub-mucous fibroids reduced pregnancy rates by interfering with implantation. In addition sub mucous fibroids and deep intra-mural fibroids indenting the uterine cavity were most predictive of impaired fertility (25, 26, 27).This was also evident in our review where the pregnancy rates were 66.3% in cases where a sub-mucous fibroid was resected. Similar conclusions were made by Lourens *et al* in their review of infertile patients with intra-mural and sub-mucous fibroids where a pregnancy rate of 45.3% was reported (34).

While there may be no defined limits to laparoscopic myomectomy with the advances in laparoscopic equipment and the high levels of training and experience some of the limiting factors described like myoma size, number and location may not hold. There is now need for prospective studies that could design a model for laparoscopic myomectomy for each level of training and experience. It may not be able to generalise some of these findings since innovation still has a place in the art of surgery, however, the golden rule of laparoscopy should not be ignores in case of any difficulty 'laparoconversion is a sign of wisdom rather than evidence of defeat '.

In conclusion, laparoscopic myomectomy is a safe and feasible in experienced hands. Although the numerous advantages revolve around and are

closely linked to the mode of entry into the abdomen, more randomised clinical trials and case controlled studies are required to assess the realistic fertility outcomes following laparoscopic myomectomy when compared to the abdominal option. This would provide better quality evidence. In addition studies should determine the true value of removing sub-serous and intra-mural fibroids so as to access the reproductive outcomes.

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