Fertility after laparoscopic myomectomy of large uterine myomas: operative technique and preliminary results

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Summary

Objective: The purpose of this study was to evaluate indications and complications of laparoscopic myomectomy with regard to the reproductive outcome of infertile women with a large leiomyomatous uterus.

Methods: From January 1997 to July 1999, 144 patients underwent laparoscopic myomectomy for a myoma measuring ≥ 5 cm in diameter. Indications for surgery were increase in size of myoma in infertile patients (70.8%), pain (44.4%) or abnormal bleeding (68%). Average size of myomas were 7.8 cm with a range of 5 cm to 18 cm. The myomas were intramural/submucosal (n = 108), subserosal (n = 15), intraligamentous (n = 14) and peduncolated (n = 7). The laparotomy conversion rate was 1.39% (n = 2); one case required a blood transfusion. Operating time ranged from 58 to 180 minutes with an average of 95 minutes. Average hospital stay was 2.6 days and the overall complication rate was 2.08%.

Eighteen patients (12.5%) underwent second-look laparoscopy. The rate of postoperative adhesion was 33.3%; there were no adnexal adhesions. In all cases ultrasonography was done one day after the operation and five weeks postoperatively to compare wound healing, the last control showed an irregular hypodense area in only 14 patients (9.7%).

Results: Twenty-six patients operated on in 1997 went on to conceive: nine vaginal deliveries, 12 Caesarean sections, four miscarriages and one ectopic pregnancy. No uterine rupture was observed. The pregnancy rate for patients submitted to laparoscopic myomectomy in 1997 (n = 38) was 34.21% at six months (n = 13) and 55.26% (n = 21) at 12 months after the procedures.

Conclusions: Our preliminary results confirm that conception occurs in the majority of infertile women with a large leiomyomatous uterus who undergo myomectomy and second-look laparoscopy leads to a low complication rate.

Key words: Laparoscopic myomectomy; Fertility; Complications; Adhesions.

Introduction

Laparoscopic myomectomy is a recent procedure indicated for infertile women with leiomyoma uteri [1-4]. These benign neoplasms are estimated to occurr in 20% to 50% of women with increased frequency during the later reproductive years [4, 5]. Advances in endoscopic surgery have proven the feasibility and safety of laparoscopic myomectomy, despite its technical drawbacks, in particular the difficulty of suturing the myometrium [6, 7].

Laparoscopic myomectomy which involves no particular risk of short-term complications, offers encouraging results in terms of fertility, complication rate and remission of symptoms [4, 8]. This offers shorter hospital stays, reduced postoperative care and a more favourable cost-benefit ratio [8, 9]. The duration of infertility before surgery and the short time interval after surgery before conception occurred confirm that myomectomy is of benefit to infertile patients with leiomyomata [4, 10].

One of the major disadvantages of myomectomy is the risk of postoperative pelvic adhesions that can adversely affect fertility, giving rise to pain and increasing the risk of ectopic pregnancy [11, 12]. A second-look laparo-

scopy has been advocated to liberate these post-myomectomy adhesions [13].

Difficulties in suturing the myometrium cause the risk of rupture during pregnancy or delivery, therefore the complication rate must be considered before proposing laparoscopy as a routine treatment [2, 3, 7-9]. The goal of this study was to conduce a retrospective study of patients undergoing laparoscopy for the removal of a large myoma in order to evaluate benefits, limits and complications of this technique and to assess fertility and pregnancy outcome after laparoscopy.

Subjects and Methods

From January 1997 to July 1999, 144 patients with a large leiomyomatous uterus underwent laparoscopic myomectomy. All gave their fully informed consent and were advised of the possibility of laparotomy. The mean age of the patients was 33.7 years (range 22-41). The indication for surgery was symptomatic fibroids: the main symptoms were infertility (70.8%; n = 102), abnormal bleeding (68%; n = 98) and pain (44.4%; n = 64); a total of 56.2% of the patients (n = 81) had more than one symptom.

Myomas were diagnosed and evaluated by transabdominal and transvaginal sonografy. In all cases of uterine bleeding, a

diagnostic hysteroscopy was always performed before myomectomy to confirm the presence of the myoma inside the uterus.

A total of 98 patients (68.05%) were nulligravida and 104 (72.2%) wished to conceive. To evaluate the infertility factors in infertile-patient ovulation studies, a post-coital test, hysterosalpingography and diagnostic hysteroscopy were employed. For the 102 infertile women, infertility was primary in 68 cases (47.2%) and secondary in the remainder, and ranged from 24 to 120 months (mean 36 months).

No preoperative medical treatment was used for large myomas and/or anaemia due to uterine bleeding. The following data were collected prospectively using a computerized database: the type of procedure carried out during the myomectomy and during the second-look, the patient's past history and preoperative investigations, the follow-up after the myomectomy and any pregnancy which occurred.

Surgical procedure

All myomectomies were performed by the same surgeon under general anaesthesia. Three sovrapubic access routes were used: one in the midline of 5 mm and one in each iliac fossa (5 mm on the right side and 10 or 15 mm on the left size). A 10 mm laparoscope was inserted through an umbilical incision or a (2-3 cm) sovra-umbilical incision and connected to a video monitor. Uterine cannulation with a Valtchev uterine manipulator after cervical dilatation was always used in order to obtain an optimal exposure of the myoma. No vasoconstrictor was used to reduce intraoperative bleeding in 127 cases (88.2%). Ornithine-8-Vasopressin (POR 8; Sandoz, Berne, Switzerland) was injected around the myoma at a concentration of 5 IU/100 ml saline solution in 17 cases (11.8 %).

Spoon monopolar electrodes were used to incise the uterus down to the pseudocapsule of the myoma which was enucleated with claw forceps and tire-bouchon by entering into the cleavage plane. Traction on the myoma, combined with countertraction on the uterus, facilitated dissection. Uterine defects were closed using interrupted absorbable sutures of the vicryl 0-CT 1 (polyglactine♦; Ethicon, Neuilly, France). The myoma was removed by a 10 mm or 15 mm electrical morcellator.

For each patient operating time was recorded and blood loss was evaluated; the number of postoperative days spent in the hospital was noted.

Second-look laparoscopy was performed under general anaesthesia; one stab incision was made in the iliac fossa of 5 mm. During the second-look procedure the existence, location and severity of the adhesions were evaluated. Minilaparoscopy with a 1.9 mm laparoscope was always done in the cases of suspected under-umbilical adhesions. The severity of the adhesions on the myomectomy scar was assessed according to the Operative Laparoscopy Study Group Classification (OLSG, 1991) (type 1: filmy avascular adhesions; type 2: dense or vascular adhesions; type 3: adhesions of the binding type).

All patients underwent ultrasonography five weeks postoperatively to compare wound healing.

Information about subsequent fertility was obtained from hospital records and direct reports from the patients. Only patients with a follow-up period at least of 18 months were included in the study.

Results

A total of 144 myomas with diameter > 5 cm were removed by laparoscopy. The myoma was interstitial/sub-mucous in 108 cases out of 144 (75%), subserous sessile in 15 cases (10.4%), peduncolated in seven cases (4.86%) and intraligamentous in 14 cases (9.7%). The size of the dominant myoma ranged from 5-18 cm and the average size was 7.8 cm.

In addition, 85 other myomas less than 5 cm were removed at the same time. In 60 cases (41.66%) multiple myomectomy was performed and the number of myomas removed per patient was as follows: one (84 cases; 58.33%), two (35 cases; 24.3%), three (17 cases; 11.8%) and four (6 cases; 4.17%).

The methods used for uterine suture were: separate stitches in one plane for myomas smaller than 5 cm (60 cases; 41.66%); suture in two planes with separate stitches in the inner plane and running suture on the surface for myomas > 5 cm.

The mean operating time was 85 minutes (range 58-180) with an average of 95 minutes; morcellation times for the myomas was 25 min (range 15-30). Only one patient required a transfusion. The rate of conversion to laparotomy was 1.39% (n = 2) for excessive blood loss. Thirty-two patients (22.2%) underwent one or more surgical procedures associated with laparoscopic myomectomy. The laparoscopic surgical procedures were: lysis in 24 patients (16.6%), tubal plasty in six patients (4.16%), appendectomy in five patients (3.47%), ovarian cystectomy in four cases (2.77%) and coagulation of endometriosis in three cases (2.08%).

There were no anaesthesiologic complications, the postoperative course was uneventful and pathologic examination revealed benign myomas in all patients. The average hospital stay was 2.6 days (range 2-5).

Eighteen patients (12.5%) underwent second-look laparoscopy and adhesions were observed in 33.3% of the myomectomy sites (6 cases). The severity of the adhesions on the myomectomy sites, assessed according to the OLSG Classification, was as follows: type 1: four cases (22.2%); type 2: two cases (11.1%); type 3: no case. The organs which were adherent to the myomectomy sites were sigmoid, epiploon and pelvic peritoneum; there were no adnexal adhesions. The risk of adhesions was not correlated to the size of the myoma but to the site of the uterine incision.

Postoperatively ultrasonography showed an intramural hematoma of various dimensions in 108 patients (75%) one day after the operation. By the second control an irregular hypodense area was seen in only 14 patients (9.7%).

A total of 26 pregnancies were achieved in 21 patients (25%) submitted to laparoscopic myomectomy in 1997, of whom 20 conceived spontaneously and one after in-vitro fertilization. Twenty-one patients delivered at term, vaginally in nine cases and by Caesarean section in 12 patients. No uterine rupture was observed. Four miscarriages occurred in three patients. In these patients no uterine cavity abnormality was found on hysteroscopic examination. A single ectopic pregnancy was treated by laparoscopic salpingectomy.

The pregnancy rate for patients submitted to laparoscopic myomectomy in 1997 (n = 38) was 34.21% at six

months (n = 13) and 55.26% (n = 21) at 12 months after the procedures. The pregnancy rate was not calculated in patients who underwent laparoscopy in 1998.

Discussion

In our experience, the limitation of the laparoscopic approach for myomectomy has been focused on the number of myomas excised (never more than four) and the size (never more than 18 cm). Laparoconversion was not required when less than four fibroids were present.

The relation between myomata and fertility is not completely understood and remains a matter of debate [5, 14]; many authors [5, 14, 15] showed significant pregnancy rates after abdominal myomectomy in patients with unexplained infertility. Increased age of patients, long duration of infertility and large size or numbers of fibroids removed represent adverse prognostic factors for fertility after laparoscopic myomectomy [10]. Therefore laparoscopy may be recommended for patients with a limited number of myomata and a short duration of fertility who wish to conceive.

Concerns regarding laparotomic myomectomy include intraoperative blood loss, longer hospital stays and adhesion formation [5]. Actually only a few randomized comparative studies, which have shown the benefits of the laparoscopic procedure, have been conduced. However comparing the two techniques is not correct because the indications may be quite different with regard to size, number and fertility status.

The indications for the second-look after myomectomy are different from one study to another; we did not check systematically for infertile patients after intervention. Howener we believe that laparoscopic surgery could help to reduce the risk of adhesions. In indications, other than myomectomy, several studies have reported a reduced adhesion risk with laparoscopic surgery compared with laparotomy (16, 17). Our work helps us to recognize that certain factors significantly increase the risk of adhesions after laparoscopic myomectomy; this knowledge could help to limit the adhesion risk in the future. Risk of adhesions seems to be correlated to the use of uterine suture while the size of the myoma does not increase the risk.

Of the 38 patients who underwent laparoscopic myomectomy in 1997, 21 (55.2%) conceived, confirming its importance in patients with unexplained infertility. These results are in accordance with previously published pregnancy rates following laparotomy [5, 10, 15, 18, 19] and laparoscopic myomectomy [8]. Our data agree with other reports [5, 8, 10, 14, 20] confirming that laparoscopic myomectomy should be considered in patients with unexplained infertility.

Uterine rupture is a rare complication in women who conceive after laparotomic myomectomy [21] depending on the possibility to restore uterine anatomy with myometrial integrity. Its risk is increased following laparoscopic myomectomy by the extensive use of electrodissection for cleavage of myomata. Two cases of uterine

rupture were reported after laparoscopic myomectomy [22-24]; In our study and in one preceding [4] no similar case was observed, despite the fact that many women (9/21) gave birth vaginally.

Laparotomic and laparoscopic myomectomy with a posterior uterine incision is associated with a higher number of adhesions than are observed after a fundal or anterior incision [12]. Further studies are necessary to assess the specific risk of adhesions after laparoscopic myomectomy and to confirm the importance of endoscopic second-look [4].

As for non-surgical management of myomas the authors retain that it can not be a good alternative option because GnRHa induces a substantial volume reduction of the fibroids but regrowth of fibroids back to baseline size occurs within approximately 12 weeks of cessation of therapy [25].

There is a place for both laparoscopy and laparotomy in the surgical management of patients with uterine myoma and the surgeon's expertise in laparoscopic suturing is a crucial requirement for laparoscopic myomectomy [26].

From these preliminary results, laparoscopic surgery for large myomas offers comparable results with those obtained by laparotomy. We believe that laparoscopy is effective for myomectomy but further studies are necessary to establish the advantages on long-term outcomes in terms of adhesion formation and fertility restoration through an appropriate selection of patients.

References

[1] Tulandi T., Laberge P.: "Laparoscopic myomectomy". Human Reproduction Update, 1997, 3, Item 3, CD Rom.
[2] Daniell J. F., Gurley L. D.: "Laparoscopic treatment of clinically significant symptomatic uterine fibroids". *J. Gynecol. Surg.*, 1991, 7, 37.
[3] Dubuisson J. B., Chapron C., Chavet C.: "Laparoscopic myomectomy. Where do we stand?". *Gynaecol. Endoscopy*, 1995, 4, 83.
[4] Darai E., Dechaud H., Benifla J. L., Renolleau C., Panel P., Madelenat P.: "Fertility after laparoscopic myomectomy: preliminary results". *Hum. Reprod.*, 1997, 12, 1931.
[5] Verkauf B. S.: "Myomectomy for fertility enhancement and preservation". *Fertil. Steril.*, 1992, 58, 1.
[6] Nezhat C., Nezhat F., Silfen S. L., Shaffer N., Evans D.: "Laparoscopic myomectomy". *Internat. J. Fertility*, 1991, 36, 275.
[7] Dubuisson J. B., Chapron C., Mouly M.: "Laparoscopic myomectomy". *Gynaecol. Endoscopy*, 1993, 2, 171.
[8] Dubuisson J. B., Chapron C., Chavet C., Gregorakis S. S.: "Fertility after laparoscopic myomectomy of large intramural myomas: preliminary results". *Hum. Reprod.*, 1996, 11, 518.
[9] Seinera P., Arisio R., Decko A., Farina C., Crana F.: "Laparoscopic myomectomy: indications, surgical technique and complications". *Hum. Reprod.*, 1997, 12, 1927.
[10] Rosenfeld D. L.: "Abdominal myomectomy for otherwise unexplained infertility". *Fertil. Steril.*, 1986, 46, 328.
[11] Dubuisson J. B., Fauconnier A., Chapron C., Kreiker G., Norgaard C.: "Second look after laparoscopic myomectomy". *Hum. Reprod.*, 1998, 13, 2102.
[12] Tulandi T., Murray C., Guralnick M.: "Adhesion formation and reproductive outcome after myomectomy and second-look laparoscopy". *Obstet. Gynecol.*, 1993, 82, 213.
[13] Hasson H. M., Rotman C., Rana N., Sistos F., Dmowski D. P.: "Laparoscopic myomectomy". *Obstet. Gynecol.*, 1992, 80, 884.
[14] Smith D. C., Uhlir J. K.: "Myomectomy as a reproductive procedure". *Am. J. Obstet. Gynecol.*, 1990, 162, 1476.

[15] Berkeley A. S., De Cherney A. H., Polan M. L.: "Abdominal myomectomy and subsequent fertility". *Surg. Gynecol. Obstet.*, 1983, *156*, 319.

[16] Nezhat C., Nezhat F., Metzger D., Luciano A. A.: "Adhesion reformation after reproductive surgery by videolaparoscopy". *Fertil. Steril.*, 1990, *53*, 1008.

[17] Lundorff P., Hahlin M., Kallfelt B., Thorburn J., Lindblom B.: "Adhesion formation after laparoscopic surgery in tubal pregnancy: a randomized trial versus laparotomy". *Fertil. Steril.*, 1991, *55*, 911.

[18] Ribeiro S. C., Reich H., Rosenberg J., Guglielminetti E., Vidali A.: "Laparoscopic myomectomy and pregnancy outcome in infertile patients". *Fertil. Steril.*, 1999, *71*, 571.

[19] Dubuisson J. B., Fauconnier A., Chapron C., Kreiker G., Norgaard C.: "Reproductive outcome after laparoscopic myomectomy in infertile women". *J. Reprod. Med.*, 2000, *45*, 23.

[20] Babaknia A., Rock J. A., Jones H. W.: "Pregnancy success following abdominal myomectomy for infertility". *Fertil. Steril.*, 1978, *30*, 644.

[21] Brown A. B., Chamberlain R., Telinde R. W.: "Myomectomy". *Am. J. Obstet. Gynecol.*, 1956, *71*, 759.

[22] Harris W. J.: "Uterine dehiscence following laparoscopic myomectomy". *Obstet. Gynecol.*, 1992, *80*, 545.

[23] Dubuisson J. B., Chavet X., Chapron C., Gregorakis S., Morice P.: "Uterine rupture during pregnancy after laparoscoic myomectomy". *Hum. Reprod.*, 1995, *10*, 1475.

[24] Friedmann W., Maier R. F., Luttkus A., Shafer A. P., Debenhausen J. W.: "Uterine rupture after laparoscoic myomectomy". *Acta Obstet. Gynecol. Scand.*, 1996, *75*, 683.

[25] Friedman A. J., Hoffman D. I., Comite F., Browneller R. W., Miller J. D.: "Treatment of leyomiomata uteri with leuprolide acetate depot: a double-blind, placebo-controlled, multicenter study". *Obstetet. Gynecol.*, 1991, *77*, 720.

[26] Tulandi T., Al-Took S.: "Endoscopic myomectomy. Laparoscopy and hysteroscopy". *Obstet. Gynecol. Clin. No. Am.*, 1999, *26*, 135.

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