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The Surgical Outcome of Intracapsular Cesarean Myomectomy. A Match Control Study.

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Abstract

Authors evaluated the outcome of intracapsular cesarean myomectomy by a prospective case-control study on 68 patients who underwent intracapsular cesarean myomectomy, compared with a control group of 72 patients with myomatosic pregnant uterus who underwent cesarean section without myomectomy. Mostly of removed myomas were subserous or intramural, fundal in 37 women (54.4%), corporal in 22 (32.3%) and peri-low uterine segment in 9 women (18.7%). The average myoma' size was 8 cm (1.5-20), in 40 women, with 8 myomas measuring 4 - 6 cm, 14 myomas between 10 - 12 cm and > 13 cm in 6 patients. Difference in blood tests and surgical outcome in intracapsular cesarean myomectomy was non significant ($p>0.05$). The average duration of hospitalization of intracapsular cesarean myomectomies was 5 days. There was no correlation between complications or duration of hospital stay and patient age, gravidity, parity or indication for cesarean section. The intracapsular cesarean myomectomy could be a reliable, feasible and safe obstetric procedure. Meticulous attention to gentle hemostasis, sharp pseudocapsule dissection, adequate approximation of the myometrium edges and all dead spaces to prevent hematoma formation, can further increase the safety of the procedure, without significant complications by experienced obstetricians.

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Introduction

Cesarean section (CS) is the worldwide most common laparotomy [1]. Operations on the uterus during the CS, except for excision of pedunculated myomas, are traditionally discouraged. While the contraindication for uterine surgery stems mainly from the fear of causing uncontrolled and perfuse bleeding, that may lead to a severe anemia, puerperal infection and to an unwanted hysterectomy. The estimated incidence of myomas in pregnancy is 2–4% [2-4].

It seems that in recent years the percentage is higher, as more myomas are frequently being observed during pregnancy of older women because of delayed childbearing.

The medical literature has reported an increasing rate of myomectomies during CS in the past decade [5].

Uterine fibroids have been associated with a 10%–40% obstetric complication rate and adverse obstetric outcomes [6-9].

The greatest risks of cesarean myomectomy resulting from lack of knowledge of the presence of uterine myoma during CS or a wrong knowledge of their position.

For these reasons, a myomectomy performed during pregnancy still remains a at risk operation. Later on, with the accumulated experience and lack of major complications coupled with the fact that no evidence-based contraindications could be found in the literature, we were inspired to develop our own technique, and to use it also for large fibroids that were located remotely from the lower uterine segment (LUS).

After the development of a detailed technique, called intracapsular myomectomy, already showed and published during laparoscopy in non pregnant women with single or multiple fibroids [10-11], authors decided to study their methods of myomas removal during CS, exploring its outcomes.

Materials and Methods

During the years 2005-2011, authors prospectively evaluated the surgical outcome of intracapsular myomectomy during CS, in University affiliated Hospitals. The study was approved by Institutional Review Board. A total of one hundred forty-five patients, selected for CS delivery were enrolled. The patients' inclusion criteria of enrollment were: documented myoma during pregnancy by ultrasounds; no evidence of antenatal bleeding; no other procedures at the time of CS besides myomectomy; no co-morbid conditions with evidence of coagulopathy.

Indications for possible cesarean myomectomy included: patients' desire, symptomatic myomas, tumor previa and degenerative myoma.

Seventy-five patients of them were counseled for possible myomectomy during CS, indicated as a mode of delivery.

They were counseled and consented for a possible cesarean myomectomy, by our technique [10,11] which can be conducted in the same manner both by laparotomy that laparoscopy, we'll call it: intracapsular cesarean myomectomy.

Prophylactic antibiotics were used for all patients, with Cefazolin 2 g i.v., before operations. All operations were ever performed by gynecologists proficient in intracapsular myomectomies on non-gravid uteri, and by CS by Stark' method, under regional anesthesia.

A routine intracapsular cesarean myomectomy was then done for all anterior fibroids cervical, body, or fundal, using the same cesarean incision where possible, or utilizing other incisions, when necessary.

Each intracapsular cesarean myomectomy was performed after LUS closuring. A linear incision was made over the uterine serosa direct to myoma by a scalpel or a monopolar electro-scalpel at low wattage (≤ 30 watt), gradually until opening the pseudocapsule, enabling to enter the relatively bloodless plan between the pseudocapsule and its myoma (**Figure 1**). Once the surface of the myoma was reached and its fiber bridges freed, the myoma was hooked and extracted from its capsule (**Figure 2**), by traction and pushing down the capsule using a sharp Metzenbaum scissors. The hemostasis during intracapsular cesarean myomectomy was always reached by a gentle low wattage coagulation (≤ 30 watt) of pseudocapsule vessels, with minimal blood loss. 10 I.U. of intravenous oxytocin drip was standard given to all patients to control bleeding, after enucleating of the fibroid.

For myomas located near LUS, we temporarily changed operation' steps: after completion of the CS, an interlocked suture is temporarily placed on the edge of the cesarean uterine incision without closure.

Then we performed intracapsular cesarean myomectomies from the edge of the cesarean incision. This also facilitates working from within the uterine cavity or from the outer part of the uterus without significant bleeding from the CS incision. After that, in case of other myomas far from LUS, surgeons make a new incision above the myoma in instances where they were located in a site remote from the CS incision.

Suturing of the fibroid base was routinely performed by using two layers of interrupted absorbable sutures (1—0 caliber vicryl) and a baseball-type suture was used for the serosa, using a continuous absorbable suture (2— 0 or 3—0 caliber vicryl), as a third layer. Pelvic irrigation was done with saline solution. Post-operatively, the oxytocin infusion was continued for 12-24 h in parallel with normal saline infusion.

Control subjects (n=72) were randomly selected among pregnant women with myomas undergoing CS without myomectomy, at the same Institutions and during the same period, and CS' indications were: breech presentation, more than one previous CS, CS on demand. These women did not received cesarean myomectomy since they refuse this operations.

We decided to avoid comparing the urgent caesarean section to have no confounding factors.

Patients' characteristics such as age, parity, previous abortions, and gestational age at delivery were recorded. The size and the location of myomas were recorded and when there was more than one myoma the biggest myoma diameter was measured.

Outcome measures were made of the number and size of fibroids removed, intraoperative blood loss, the need for blood replacement, and other intraoperative or post-operative complications. Each surgeon collected blood loss into the surgical drape for caesarean section and into the graduated bag of the aspirator cannula and all were recorded by anesthetists. Records were made of the third day hematocrit values, any complications or morbidities, and the duration of hospital stay. Anemia was defined as hematocrit less than 30%. Statistical evaluation of the data was performed by Chi-square test and Student's t-test. The level of significance was set at $p<0.05$.

Results

Sixty-eight myomas were removed in 61 elective and 7 emergency procedures. Both myomectomy and control groups were similar in terms of characteristics without statistical differences (**Table 1**).

Analyzing also other characteristics, as gestational diabetes, prior surgery, prior abortions, history of extrauterine pregnancies or pelvic inflammatory disease, adhesions, authors did not evidenced differences among two groups.

Patients who received regional anaesthesia were equally proportioned in two groups: one by combined spinal epidural technique (56%) and other by spinal anesthesia (44%) [12].

Largely of removed myomas were subserous or intramural: 48 subserous, 14 intramural and 6 pedunculated. Of these, 12 had multiple sites myomas (17,6%), but we try to use always the same hysterotomy for neighbors fibroids [10].

Sites of myomas' removal were: fundal in 37 women (54.4%), corporal in 22 (32.3%) and peri-low uterine segment in 9 women (18.7%), where we temporarily changed operation' steps just in 5 women. The average myoma' size was 8 cm (1.5-20), in 40 women, with 8 myomas measuring 4 - 6 cm, 14 myomas between 10 - 12 cm and > 13 cm in 6 patients.

Difference in blood chemical and surgical outcome in intracapsular cesarean myomectomy was non statistical significant (**Table 2**).

About post-operative course, 5 patients had postpartum fever of 38.8°C, on average, for two consecutive days after surgery (7.3%); the blood culture didn’t show any bacteria and patients were treated by large spectrum antibiotics.

The average duration of hospitalization of intracapsular cesarean myomectomies was 5 days, with six patients requiring more than 5 days of hospitalization (8,8%); these five patients felt too weak to be discharged, so they preferred to stay in the hospital an extra day.

There was no correlation between complications or duration of hospital stay and patient age, gravidity, parity or indication for CS.

None of patients underwent repeated surgery after intracapsular cesarean myomectomy and no hysterectomy was required after intracapsular cesarean myomectomy.

Discussion

Our data show no difference between intracapsular cesarean myomectomy group and control group, in term of pre and post-operative hemoglobin values, mean change in hemoglobin values, incidence of intraoperative hemorrhage, frequency of blood transfusion and of post-operative fever. The only two parameters that affect negatively the group submitted to intracapsular cesarean myomectomy are the duration of operation and the length of hospital stay.

Since obstetricians often confronted with fibroids while performing CS and face the dilemma of how they should be managed, considering the cost-benefit of our study, we can say that intracapsular cesarean myomectomy procedure can be performed with some confidence, without affecting adversely the postoperative course and clinical outcomes.

The problem of myomas in pregnancy is rather common and, unfortunately, clinicians have to compare against it; for example, a myoma located in the LUS can cause dystocia or present as a tumor previa, resulting in CS. In such cases, and in order to deliver the baby, the obstetrician is faced with the emergency decision of making the incision through or near the myoma, removing it, or choosing the classical incision to deliver the baby while avoiding cutting through or near the myoma. Moreover, pregnancy induces profound anatomical and physiological changes, with uterine artery diameter doubles and a progressive increase in the uteroplacental blood flow [13].

Thus, any surgical procedure performed on or around the uterus has the potential of causing severe hemorrhage. For this reason, performing a myomectomy during CS has consistently been condemned and discouraged as a risky procedure. In cases of a pedunculated subserous fibroid attached to the uterus with a small pedicle, suturing and excision of the pedicle is easy. However, resection of an intramural myoma during CS is inadvisable and contraindicated by most of the leading textbooks of obstetrics [14,15] primarily because it may stimulate perfuse uncontrolled bleeding that could lead to hysterectomy. Furthermore, myomas will often undergo remarkable involution after delivery and may even become pedunculated, thus making a myomectomy (if at all necessary) easier and safer as a postpartum intervention than at the time of cesarean section [14,15].

Furthermore, because of bizarre nuclear changes myomas resected during pregnancy were often confused with sarcoma, thus leading to unnecessary anxiety and fear.

In the medical literature revision, however, there are several preliminary data and lately larger studies indicating that performing a myomectomy during CS or even during pregnancy is probably a safer procedure than previously believed.

In 1989, Burton et al [9] were probably the first to report the procedure of a myomectomy during pregnancy and CS. They reviewed an 8-year experience with surgical management of leiomyomata during pregnancy at the Los Angeles County Women's Hospital. Five women underwent exploratory laparotomy only, six had a myomectomy during pregnancy, and three had a hysterectomy; one patient aborted after surgery. Thirteen other women had incidental myomectomies at cesarean delivery; one of these had an intraoperative hemorrhage. No other complications occurred.

Celik et al [16] also reported in 2002 that a myomectomy could be safely performed during pregnancy. Five pregnant women with myomas requiring surgical removal because of severe pain underwent a myomectomy at a median gestational age of 17.8±3.4 weeks. The mean size of the myomas was 14.0±3.8 cm. No major surgical and postoperative complications were observed and all pregnancies continued to term.

In the last decade several authors reported their experience with cesarean myomectomies.

Ehigiegba et al [17] prospectively assessed the intra- and post-operative complications of cesarean myomectomies in 25 pregnancies. Patients with known fibroids were required to provide their consent for a possible cesarean myomectomy. Myomas in the anterior uterine wall (cervical, body or fundal) were removed through the CS incision when possible, otherwise other incision(s) were performed. Nineteen patients (76%) underwent emergency CS after trial of labor, while 6 (24%) had elective CS. A total of 84 fibroids were removed. In most women there were only 1-2 myomas, but in one patient 22 myomas (!) were extracted; 57% of the myomas were intramural, 35.7% subserous of which only 1% was pedunculated. Anemia was apparent in 60% of patients but only five patients (20%) required blood transfusion. No case necessitated hysterectomy. Three patients (12%) had subsequent pregnancies, two of whom had normal vaginal deliveries and one underwent a repeat CS.

Recently, two studies compared the results of cesarean myomectomies to "no touch" CS. The largest report by Roman and Tabsh [18] retrospectively evaluated 111 women who underwent a cesarean myomectomy and 257 women with documented fibroids who underwent CS alone. The two groups were similar with respect to median age, median parity, median gestational age and median size of the

fibroids. Most patients in both groups underwent low transverse incision CS. In 86% of the patients the fibroids were incidental findings, while in the rest symptoms such as pain, dystocia and unusual appearance of the myoma dictated its removal. The incidence of hemorrhage, defined a drop in hemoglobin greater than 3 g/dl [19], in the study group was 12.6%, compared with 12.8% in the control group ($p = 0.95$). There was also no statistically significant increase in the incidence of postpartum fever, operating time, and length of postpartum stay. The size of fibroid did not appear to affect the incidence of hemorrhage. After stratifying the procedures by type of fibroid removed, intramural myomectomy was found to be associated with a 21.2% incidence of hemorrhage, compared with 12.8% in the control group, but this difference was not statistically significant ($p = 0.08$). No patient in either group required hysterectomy or embolization following the operation.

A similar study by Kaymak et al [20] on 40 patients undergoing a cesarean myomectomy compared to 80 patients with untouched myomas during CS also showed that performing a myomectomy during CS does not increase the surgical and postoperative complication rate.

Recently, Jeong-Heon et al [21] successfully used purse-string suture during cesarean section to perform a cesarean myomectomy on 31 patients. They showed that a myoma could be excised without profuse bleeding, while an assistant maintains strong tension on the purse-string suture around the myoma: the suture was tightened and tied immediately after complete resection of the myoma and then stitches of another purse-string suture were placed alternately with each previous stitch in the inner side of the first suture. Authors have used this method for more than 3 years and have not observed failures and serious complications, such as late hemorrhage and uterine rupture during a subsequent pregnancy.

Ma et al reported in 2010 [22] a cesarean myomectomy at 36 weeks' gestational age, with a live male baby weighing 2,858 g successfully delivered, and removal of intramural myoma of 40 cm in diameter. The uterine arteries were ligated bilaterally after closing the wound of the uterus. Estimated total blood loss was 1,400 mL. Postoperative maternal hemoglobin level was 9.4 g/dL without a blood transfusion. Postpartum uterine contraction occurred without incident, and the woman and her baby were discharged 1 week later with no other complications. The pathology report revealed that the leiomyoma weighed 3,645 g, with red degeneration and hyaline disintegration.

Although all these reports and studies indicate a good outcome after a cesarean myomectomy, or even after performing a myomectomy during pregnancy, one should remember that hemorrhage can still occur and lead to grave consequences.

Exacoustos et al [7] reported nine myomectomies performed during cesarean delivery. Of these, three were complicated by severe hemorrhage, necessitating hysterectomy. The authors emphasized the role of various ultrasound findings in identifying women at risk for myoma-related complications: the size of the myoma, its position, location, relationship to the placenta, and echogenic structure.

Several recent studies have described techniques that can minimize blood loss at cesarean myomectomy, including uterine tourniquet [23,24] bilateral uterine artery ligation [25] and electrocautery [26].

However, most of the literature presented, as well as our experience indicate that a CM does not increase the risk of hemorrhage, postoperative fever or prolong hospital stay.

Authors think that the intracapsular cesarean myomectomy could be a feasible and reliable procedure in pregnant women, especially when performed by an experienced surgeon. If pedunculated myomas can be safely removed generally without difficulty, subserous and intramural myomas that are located at the LUS can and probably should be removed prior to CS or immediately after fetus delivery and not bypassed by performing a longitudinal incision.

Performing an elective myomectomy from other uterine locations should be considered with caution, since most of these myomas will nevertheless involutes to an insignificant size during puerperium. Meticulous attention to gentle hemostasis, intracapsular cesarean myomectomy using sharp dissection with Metzenbaum scissors, adequate approximation of the myometrium and all dead spaces to prevent hematoma formation, should increase the safety of the procedure. Despite the lack of prospective, randomized studies the retrospective data clearly show that the old dictum that discouraged CM should be reassessed. Women with known myomas undergoing elective or emergency CS should be properly informed in order to obtain their consent for the option of performing a cesarean myomectomy.

Conclusion

Fibroids in pregnancy are a challenge to the obstetrician and medical dilemma because the patients need to be prospectively informed as regarding the possible delivery complications. The additional cesarean myomectomy has been debatable and was considered relatively contraindicated for many years in obstetric experience. Nevertheless, this dictum was quite based on conjectural evidence, but rather on clinical experience. Our experience by intracapsular cesarean myomectomy and the recent

medical literature, however, indicates that these procedures are probably feasible and reliable if correctly performed, as reported by Adesiyun et al and by Song D et al.

The authors agree on the need to continue their clinical experience by increasing the number of patients enrolled in the intracapsular cesarean myomectomy and verifying the ability to run the intracapsular cesarean myomectomy in a variety of clinical conditions.

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THE SURGICAL OUTCOME OF INTRACAPSULAR CESAREAN MYOMECTOMY. A MATCH CONTROL STUDY.

Table 1

Patients' characteristics.

	Cesarean Myomectomy (CM) *68 patients*	*Control Group (CS)* *72 patients*	*P value*
Maternal age (years)	34.9±5.6	36.2±3.3	NS
Parity (n)	1.1±1.3	1.2±1.5	NS
Previous abortions (n)	0.5±0.7	0.4±0.8	NS
Gestational age (weeks)	38.2±1.6	38.5±1.3	NS
BMI	26±1.6	28±0.3	NS
NS: non significant			

Table 2

Blood tests and outcome differences among Intracapsular Cesarean Myomectomy (ICM) and Cesarean Sections, as control group.

	Cesarean Myomectomy (CM)	*Control Group (CS)*	*P value*

	68 patients	*72 patients*	
Pre-operative hemoglobin values (g/dl) (mean±S.D.)	12.1±1.5	11.8±1.3	NS
Post-operative hemoglobin values (g/dl) (mean±S.D.)	10.6±1.8	10.2±1.4	NS
Mean change in hemoglobin values (g/dl)	1.5±0.3	1.6±0.1	NS
Incidence of intraoperative hemorrhage (>1 L of blood)	3 (4.4%)	4 (5.5%)	NS
Frequency of blood transfusion	4 (5.8%)	4 (5.5%)	NS
Frequency of postoperative fewer	5 (7.3%)	3 (4.1%)	NS
Duration of operation (minutes) (mean±S.D.)	50.5±19.2	41.6±8.2	> 0.05
Length of hospital stay (days) (mean±S.D.)	5.0±1.4	4.4±0.7	> 0.05

S.D.: standard deviation

NS: non significant

Legend

Figure 1

On the left, a uterine transvaginal ultrasound section evidencing, on the top, the myoma surrounded by the pseudocapsule, on the bottom, the pseudocapsule vascular network as a “ring of fire” around the fibroid, enhanced by EcoColorDoppler; On the right, the leiomyoma pseudocapsule fibrovascular network surrounding myoma.

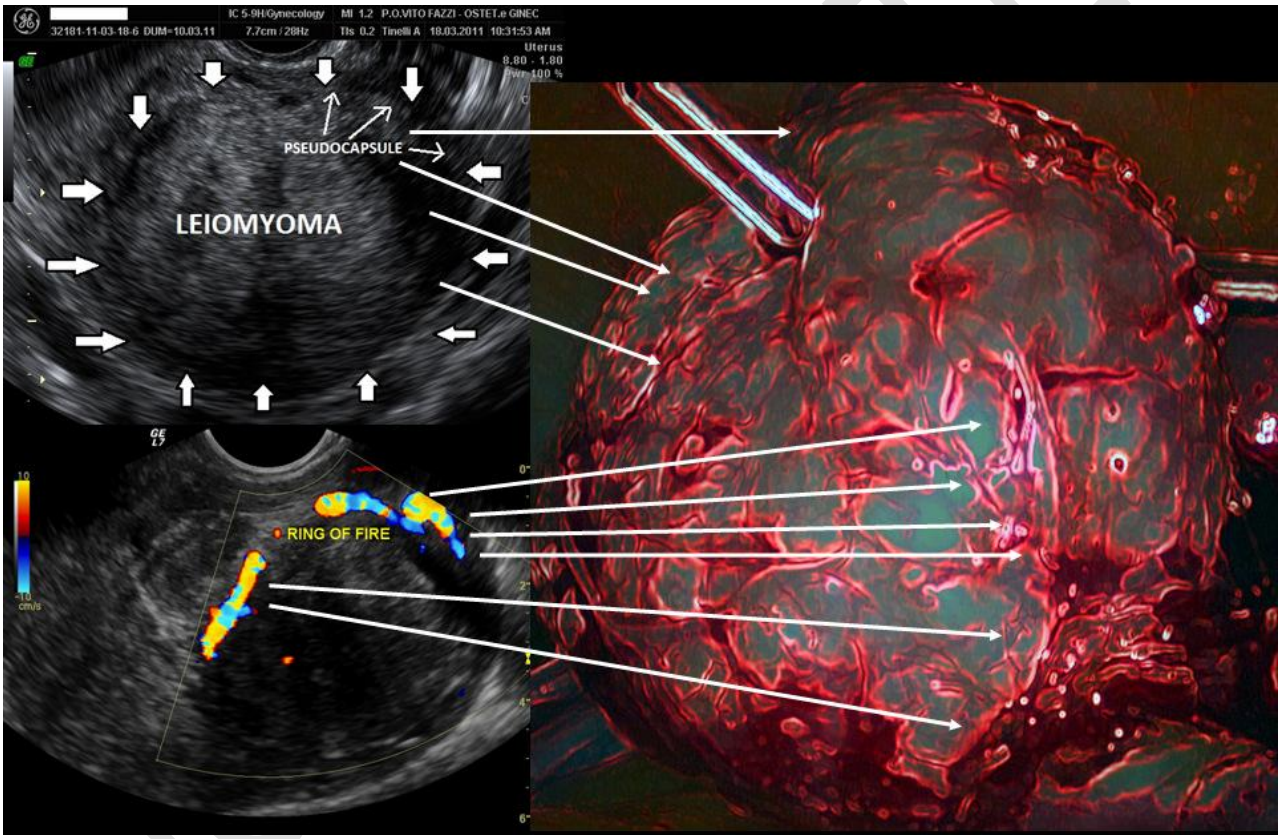

Figure 2

A myoma removal by intracapsular cesarean myomectomy; the image highlights the gentle dissection of pseudocapsule surrounding myoma during its enucleating (the arrows indicate the myoma pseudocapsule).