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Caesarean Myomectomy
Feasibility and safety

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عملية استئصال ورم الرحم العضلي أثناء إجراء العملية القيصرية: إمكانية إجراء العملية والسلامة

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الملخص: **الهدف**: جرت العادة على عدم تقبل استئصال ورم الرحم العضلي أثناء إجراء العملية القيصرية بسبب المخاوف من حدوث نزيف قد يصعب السيطرة عليه أثناء العملية الجراحية وبسبب المضاعفات المتوقعة بعد العملية. ومع ذلك، فقد ظهر مؤخرا في العديد من الأبحاث أن استئصال ورم الرحم العضلي أثناء العملية القيصرية لايزيد من خطر النزف أو المضاعفات بعد العملية الجراحية. **الطريقة**: نقدم هنا وصفا لثمان حالات من مستشفى جامعة السلطان قابوس، عُمان، حيث تم إجراء استئصال أورام ليفية في أسفل الرحم أثناء العملية القيصرية. كانت سبعة من الأورام الليفية المستأصلة في جدار الرحم الأمامي، وورم ليفي في الجدار الخلفي للرحم والتي تم استئصاله للتمكن من إغلاق شق الرحم. النتائج: كان متوسط عمر النساء اللاتي تم إجراء العملية لهن 28.7 سنة ومتوسط عمر الحمل عند الولادة 36.75 أسبوعا. و فيما يتعلق بفقدان الدم أثناء العملية، فقدت مريضة واحدة 900 مل، وخمس نساء فقدن بين 1 – 1.5 لترا، واثنتان فقدن بين 1.5 – 2 لترا، وفقدت امرأة 3.2 لترا من الدم حيث كان قياس الورم الليفي عندها 10×12 سم. وعلى الرغم من كون أغلبية الأورام الليفية كبيرة (7 من الأورام الليفية كانت أكبر من 5 سم في الحجم) و 50٪ منها صنفت من ضمن التليفات الداخلة في الجدار العضلي للرحم، لم تكن هناك حاجة لاستئصال الرحم. وقد استدعت حالة واحدة لقطع التغذية الدموية، بينما استدعت حالة أخرى للقسطرة ببالون شريان الرحم قبل إجراء العملية. تم التأكد من حجم الأورام الليفية عن طريق فحص النسيج المرضي بعد عملية الاستئصال. عملية استئصال الورم الليفي أضافت 15 دقيقة إلى الوقت الكلي المعتاد لإجراء العملية القيصرية ويوما واحدا آخرا للبقاء في المستشفى ولم تسجل أية مضاعفات للأمهات أو أطفالهن خلال المكوث في المستشفى. **الخلاصة**: استئصال أورام الرحم العضلية أثناء العملية القيصرية في نساء مختارات هو إجراء آمن وفعّال في مستشفيات الرعاية الثالثية بوجود جراحين ذوي خبرة.

مفتاح الكلمات: ولادة قيصرية، عملية استئصال ورم الرحم العضلي، أورام ليفية، حمل، نزيف، عُمان.

ABSTRACT: ***Objectives:*** Caesarean myomectomy has traditionally been discouraged due to fears of intractable haemorrhage and increased postoperative morbidity. However, a number of authors have recently shown that myomectomy during Caesarean section does not increase the risk of haemorrhage or postoperative morbidity. ***Methods*:** We present a series of 8 cases from Sultan Qaboos University Hospital, Oman, where myomectomy was performed during Caesarean section for large lower segment fibroids. Seven were anterior lower segment fibroids, while one was a posterior lower uterine fibroid which interfered with closure of the uterine incision. The antenatal course, perioperative management, and postoperative morbidity are discussed. ***Results:*** The average age of the women was 28.7 years and mean gestational age at delivery was 36.75 weeks. Regarding intra-operative blood loss, 1 patient lost 900 ml, 5 patients lost 1–1.5 litres, 2 lost 1.5–2 L, and 1 patient with a 10 x 12 cm fibroid lost 3.2 L. Despite the majority being large myomas (7 of the 8 patients had myomas >5 cm in size) and 50% being intramural, no hysterectomy was required. Stepwise devascularisation was necessary in one case and preoperative placement of uterine balloon catheters was necessary in another. The size of the fibroids was confirmed by histopathology. Myomectomy added 15 minutes to the operating time and 1 day to the hospital stay, but there was no significant postoperative morbidity. Neonatal outcome was good in all patients. ***Conclusion*:** In selected patients, myomectomy during Caesarean section is a safe and effective procedure at tertiary centres with experienced surgeons.

Keywords: Caesarean section; Myomectomy; Fibroids; Pregnancy; Haemorrhage; Oman.

Advances in knowledge

- *This is the first study in Oman addressing the controversial and important issue of performing myomectomy during Caesarean section. This procedure is reported to be associated with intractable haemorrhage and postoperative morbidity by some authors while other authors advocate its safety.*
- *Caesarean myomectomy is safe to perform in selected patients and results in no significant post-operative morbidity. The procedure can help younger patients avoid hysterectomy.*

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- *The article highlights various new techniques that effectively control haemorrhage during Caesarean myomectomy, and has educational value for less experienced obstetricians.*

Application to patient care

- *Caesarean myomectomy allows women to have a better obstetric outcome in future pregnancies, and to avoid hysterectomy.*
- *It relieves symptoms associated with fibroids and negates the need for later surgery or sonographic follow-ups for the fibroid after delivery.*
- *It is a safe procedure in selected patients when performed in tertiary care hospitals by experienced obstetricians with newer measures available to curtail haemorrhage.*

The incidence of myoma associated with pregnancy is reported at 0.3–5%, with a majority of myomas not requiring surgical intervention during pregnancy or delivery.[1–4] Myomectomy at the time of a Caesarean section has traditionally been discouraged due to fears of intractable haemorrhage and increased postoperative morbidity. However, a number of authors have recently shown that myomectomy at Caesarean does not increase the risk of haemorrhage.[2,10–21]

We present a series of 8 cases where myomectomy was performed during Caesarean section for large lower segment fibroids ranging in size from 4 to 12 cms. The antenatal course, perioperative management, and postoperative morbidity are discussed.

Methods

We performed a retrospective cohort study of 8 patients with myomas which resulted in pregnancy complications. All 8 patients underwent myomectomy at the time of Caesarean section at Sultan Qaboos University Hospital (SQUH) between January 1999 and December 2010. Ethical approval for the study was obtained from the University Medical Research and Ethics Committee (MREC #399). Patients' medical records were perused for demographic data, parity, and antenatal course, type of Caesarean section, size and location of the fibroids, blood loss, postoperative morbidity, and neonatal outcome. All of the women in the study fulfilled the following five criteria: 1) documented fibroid during the index pregnancy by antenatal ultrasound or at surgery; 2) delivery by Caesarean; 3) no evidence of antenatal bleeding; 4) no other procedure at Caesarean apart from myomectomy, and 5) no pre-existing coagulopathy. Informed consent was obtained from all patients preoperatively. Of the 8 patients studied, 7 had anterior lower segment fibroids and one had a posterior lower uterine fibroid which interfered with closure of the uterine incision. Adequate blood and blood products were arranged preoperatively.

Myomectomy was performed in the conventional fashion using an incision over the myoma, enucleating it, and obliterating the dead space in two to three layers using interrupted 1-0 Vicryl sutures (Ethicon Inc., New Jersey, USA). Anterior lower segment myomas encroaching on the proposed incision line were excised prior to delivery of the baby while the others were removed after the baby had been delivered. The Caesarean incision was closed in 2 layers with 1-0 Vicryl sutures. High dose oxytocin was used intraoperatively and postoperatively, and some patients required additional uterotonic agents. Blood loss was estimated from suction aspiration, and from weighing mops, swabs and drapes used during surgery. Prophylactic antibiotics were administered to all the patients. A review of literature was performed using PubMed, Medline, and Google.

Results

The average age of the women was 28.7 years. The age, parity, and associated risk factors of the patients; factors, size and location of the myomas; the operative findings and incisions used during surgery, and the complications and neonatal outcomes are summarised in Table 1. Of those in the study, 7 of the 8 patients had lower segment anterior wall fibroids at or close to the incision site, and one patient had a large posterior wall fibroid which projected through the uterine incision after delivery of the baby and needed removal to facilitate

Table 1: Demographic and clinical profile, operative findings and outcome of the patients who underwent Caesarean myomectomy at our institution

Age/Parity G/P/A	Risk factors/ co-morbidities	No. & location of fibroids	Size at start of pregnancy	Size at CS	GA at CS in wks	Est. blood loss in ml	Baby details	Incision	Postoperative morbidity
26 yrs G6/P1/A4	Prev 1 CS	Intramural LUS anterior wall + multiple small fibroids	6.2 x 4.3 cms	7 x 6 cms	38	1,100	Female 2,660 gms Apg 9/10	Pfannenstiel UT- Lower seg transverse	None
19 yrs G1	Essential HT PPROM 32 w Betamethasone x 2 doses	Lower segment left side. Subserous	8.6 x9.1 cms	9 x 9 cms Infarction	33	1,100	Female 2,160 gms Apg 8/9	Vertical SUMLI UT-Low vertical ROP, deflexed head	None
35 yrs G4/P3	None	Lower segment ant. Wall Intramural	9x10 cms	8 x 8 cms	38	1,500 2 u PRBC Uterine @ balloon catheter *in situ*	Male 2,830 gms Apg 9/10	Pfannenstiel UT-Lower seg transverse	Blood transfusion
24 yrs G2/P1	Breech, polyhydramnios. Prev. multiple myomectomy (4). Cavity not entered	Lower segment anterior wall Intramural	6 x 7 cms	8 x 7 cms	38	1,100 Atonic PPH Stepwise devascularisation	Female 2,790 gms Apg 8/9	Pfannenstiel UT-Lower segment transverse	None
28 yrs G2/P1	Previous LSCS PIH	Lower segment posterior wall Subserous	6.5 x 5.5 cms	6.5 x 6 cms	38	1,100 2 u PRBC	Female 3,000 gms Apg 9/10	Pfannenstiel UT- Lower segment transverse	Blood transfusion
38 yrs G5/P4	None	Lower segment rt side anterior Subserous	9.8 x 7 cms	10 x 12 cms Degen.	37	3,200 6 u PRBC 4 FFP, uterotonics	Male 2,880 gms Apg 5/9	Vertical SUMLI UT- High lower segment transverse	Anaemia Blood transfusion
28 yrs G1	PIH	Lower segment anterior Subserous	6 x 5 cms	7 x 5 cms Haem.	37	900	Female 2,690 gms Apg 9/10	Pfannenstiel UT- Lower segment transverse	None
32 yrs G9/P2/A6	Previous 2 LSCS	Upper part of lower segment anterior Intramural	4 x 4 cms	4 x 4 cms Calcified	35	2,000 2 u PRBC	Female 2,530 gms Apg 9/10	Pfannenstiel UT- Lower segment transverse	Blood transfusion

Legend: G/P/A = gravida/para/abortion; CS = Caesarean section; GA =gestational age; LUS = lower uterine segment; HT = hypertension; PPROM = preterm premature rupture of membranes; SUMLI = subumbilical midline longitudinal incision; ROP = right occipito-posterior position; UT = uterus; LSCS = lower segment Caesarean section; PIH = pregnancy induced hypertension; PPH = postpartum haemorrhage; PRBC = packed red blood cells, FFP = fresh frozen plasma; Apg = Apgar score at 1 and 5 minutes

closure. In total, 4 were intramural fibroids (50%) and 4 were subserous. The size varied from 4–12 cm with 7 of them being larger than 5 cm in diameter. Regarding intra-operative blood loss, 1 patient lost 900 ml, 5 patients lost 1–1.5 litres, 2 lost 1.5–2 L, and 1 patient with a 10 x 12 cm subserous fibroid lost 3.2 L. Stepwise devascularisation was needed to control atonic postpartum haemorrhage (PPH) in 1 patient. Preoperative placement of uterine balloon catheters was used in another patient with a large posterior wall fibroid. The balloon was inflated intra-operatively after delivery of the baby, effectively controlling the haemorrhage. None of the patients required hysterectomy.

Neonatal outcome was good in all the patients. The mean gestational age at delivery was 36.75 weeks (range 33–38 weeks). The 5 minute Apgar score was 9–10 in all the newborns with birth weights ranging from 2160 grams (preterm 33 weeks) to 3,000 grams.

Table 2: A comparison of various studies on Cesarean myomectomy

Authors	Roman[11]		Kwon[15]	Kaymak[2]		Ehigiegba[16]	Ortac[10]	Ahikari[17]	Omar[19]	Machado LSM
Year	2004		2003	2004		2001	1999	2006	1999	2011
No. and type of cases	368		88	120		25	22	14	2	8
	111 CM	257 CS	NA	40 CM	80 CS	NA	NA	NA	NA	NA
Maternal Age	37	35	32.5±4.4	31.9±4.5	30.8±3.1	30.8±3.8	NA	25–35 yrs	NA	28.75
Parity										
Para 0	NA	NA	84.1%	0.8±1.2	1.1±1.1	13	NA	11	2	2
Para 1-4	NA	NA	16.9%	NA	NA	12	NA	3	0	6
Mean GA at CS	38 (27.3–41.6)	39 (24–42.6)	38±1.19	37.7±2.5	37.6±1.4	36.9 (29–42)	NA	NA	NA	36.75 (33–38)
No. of Fibroids										
Single	91		67%	75%		10	NA	12	2	7
Multiple	20		33%	25%		15	NA	2	0	1
Location										
Lower US	NA		50%	11 (27.5%)		NA	NA	6	2	7
Upper US	NA		50%	22 (55%)		NA	NA	5	-	1
Both	NA		-	7 (17.5%)		NA	NA	2	-	-
Pedunculated	NA		-	0		NA	NA	1	-	-
Size										
<5 cms	Mean 3.5 (0.9–30)	Mean 3 (1–20)	NA	≤3cm, 2 (5%)		Most 2–4 cms	Mean 22 (9.5±4.6) range 5–19 cm	5	NA	1
5-10 cms				4–5cm, 14 (35%)		2		7	-	6
>10 cms				≥6cm, 24 (60%)		-		2	2	1
Average Operating time										
LSCS	-	51 (20–07)	NA	-	44.4±6.7	-	-	35±3.28		1,500 ml
CM	55 (25–161)	-	NA	53.3±18.6	-	NA	41.6±8 Range 25–60	54.1±3.84 P >0.05	NA	900–3200ml
Blood loss										
Blood loss	12.6%	12.8%	731.5 ml	12.5%	11.3%	876 ±312 ml	324.2 ml	472 ml	NA	1,500 ml
Range	Significant haem.	Significant haem.	400–2500ml	-	-	400–1700ml	-	359–600ml		900–3200ml
Postoperative Morbidity										
Blood transfusion	0.9%	1.2%	1 relap. for bleeding	4 (10%)	5 (6.3%)	5	NA	1	NA	4
Fever	4.5%	4.7%	12 (13.6%)	3 (7.5%)	8 (10%)	2 (8%)	NA	NA	NA	0
Anaemia	NA	NA	NA	NA	NA	60%	NA	NA	NA	2
Hysterectomy	-	-	-	-	-	-	-	-	-	-
Postop Hospital stay in days (range)	3.6 (2–7)	3.4 (2–12)	NA	3.3±0.8	2.7±0.6	7.4±2.2 (3–12)	3.7±0.9 (2–6)	6	NA	5.0±0.8 (4-7)

Legend: GA = gestational age; UIS =uterine segment; CM = Caesarean myomectomy; CS = Caesarean section; LSCS = lower segment Caesarean section; NA = not available or not specified; relap = relaparotomy

Discussion

Uterine myomas are found in approximately 0.3–5% of pregnant women, with the increasing incidence attributable to the fact that more and more women are delaying childbearing.[1–4] One in ten of these women will have complications during pregnancy that are related to the myoma. A great majority of myomas associated with pregnancy remain asymptomatic and do not require treatment, with about 22–32% showing increased growth.[5] Larger fibroids (>5cm) are more likely to grow during pregnancy and can cause miscarriages, obstructed labour, malpresentations, pressure symptoms, pain due to red degeneration, preterm labour, preterm premature rupture of membranes,

retained placenta, postpartum haemorrhage and uterine torsion.[5–7] Katz *et al.* found that 10–30% of women with myomas associated with pregnancy had complications as listed above.[7] Caesarean section rates in women with myomas are higher, up to 73%, mainly due to obstructed labour and malpresentations.[3]

Preservation of the uterus without loss of its function and compromising the mother's ability to bear more children is definitely a greater surgical achievement than a hysterectomy; hence, Caesarean myomectomy must be considered by experienced obstetricians wherever feasible. The orthodox view of one of the pioneers of myomectomy in non-pregnant women, Bonney, is reflected in his writings: "It is tempting for the adventurous and sympathetic surgeon to condense the operation of lower segment Caesarean section and myomectomy into one undertaking and save his patient the ordeal of a second admission to hospital. This kindly but misguided policy we heartily deprecate." However, his pupils, Hawkins and Stallworthy, did advocate Caesarean myomectomy in selected cases, as in the incidence of anterior lower segment myomas on the proposed incision line.[8]

Exacoustos and Rosetti reported that in their series of 9 cases of Caesarean myomectomy, three were complicated by severe haemorrhage necessitating hysterectomy; hence, they recommended caution while making the decision to perform this procedure.[9] Some authors report a higher incidence of postpartum haemorrhage and puerperal sepsis if the fibroid is not removed at Caesarean section.[3,4] In addition, the uterus in the immediate postpartum phase is better adapted physiologically to control haemorrhage than at any other stage in a woman's life; hence, it seems logical to perform Caesarean myomectomy.

The management of fibroids encountered at Caesarean section remains a therapeutic dilemma. Myomectomy during Caesarean section has traditionally been discouraged due to the risk of uncontrollable haemorrhage, unless the myoma is pedunculated.[11] Recent studies have described techniques to minimise blood loss at Caesarean myomectomy including uterine tourniquet, bilateral uterine artery ligation, and electrocautery.[10,12,13] In our series, stepwise devascularisation was required to control atonic PPH in one patient; in another patient uterine artery balloon catheters were placed preoperatively. Several authors have now shown that in selected patients and in experienced hands, myomectomy at the time of caesarean section is a safe and effective procedure.[2,10–21]

The experience of different authors who have performed Caesarean myomectomies is presented in Table 2, including the present series. Roman *et al*. compared the outcomes of 111 patients who had had myomectomy at Caesarean with 257 patients who had undergone Caesarean alone. No significant difference was found in the incidence of intra- or postoperative complications between the 2 groups;[11] however, accurate conclusions cannot be drawn from that study as only 22.7% of the patients had fibroids greater than 6 cm in diameter (median 3.5 cm).

Kaymak *et al.* compared 40 patients who underwent myomectomy at Caesarean section with 80 patients with myomas who underwent Caesarean section alone. The mean size of the fibroids removed was 8.1 cms compared to 5.7 cms in the controls. The authors found no significant difference in the incidence of haemorrhage (12.5% in the Caesarean myomectomy group versus 11.3% in the controls), postoperative fever, or frequency of blood transfusions between the 2 groups, and concluded that myomectomy during Caesarean section is not always a hazardous procedure and can be performed by experienced obstetricians without any complications.[2]

Ortac *et al.* reported 22 myomectomies during Caesarean for large fibroids (>5 cm) and advocate it to minimise postoperative sepsis.[10] In another study by Burton *et al.*, of the reported 13 cases of myomectomy at Caesarean section, only 1 case had intra-operative haemorrhage and they concluded it to be safe in selected patients.[14]

A large retrospective case-control study by Li Hui *et al.* assessed the effectiveness, safety, complications, and outcomes of myomectomy during Caesarean section in Chinese women with fibroids antedating pregnancy.[20] The study group of 1,242 pregnant women with fibroids who underwent myomectomy during Caesarean section was compared with 3 control groups: 200 pregnant women without fibroids (Group A), 145 pregnant women with fibroids who underwent caesarean alone (Group B), and 51 pregnant women who underwent Caesarean hysterectomy (Group C). No significant differences were noted between

the groups in the mean haemoglobin change, the frequency of haemorrhage, postoperative fever, or the length of hospital stay. These findings corroborate the fact that myomectomy during Caesarean section is a safe, effective procedure not associated with significant complications.

Further strengthening the increasing trend towards Caesarean myomectomy is yet another case series by Hassiakos *et al.*[21] They compared 47 pregnant women with fibroids who underwent Caesarean myomectomy with 94 pregnant women with fibroids who had Caesarean section alone. Myomectomy added a mean operating time of 15 minutes to the Caesarean section. No patient had a hysterectomy, postpartum complications, or blood transfusion. The length of hospital stay was comparable in both groups; hence, these authors also generally recommended performing the procedure. Yuddandi reported removal of a 33.3 × 28.8 × 15.6 cm fibroid at Caesarean with an intra-operative blood loss of 1,860 ml, necessitating blood transfusion.[22] Leanza *et al.* and Igwegbe *et al.* have also reported large myomas removed at Caesarean section.[23–24]

In our series of 8 patients, 5 lost less than 1.5 L of blood and there was no significant postoperative morbidity. The patient with a blood loss of 3,200 ml had the largest myoma in this series (10 x 12 cm) which showed evidence of degeneration and also had atonicity of the uterus necessitating a higher dose of oxytocin, carboprost, and a blood transfusion. Since the fibroid was on the right anterior lower segment, a low vertical incision was used. The large size of the fibroid and atonic uterus led to the increased haemorrhage. There were no postoperative complications.

Despite the majority of the patients having large myomas and 50% being intramurally located, no hysterectomy was required in any patient. Stepwise devascularisation was necessary in one case. The size of the fibroids was confirmed by the pathology reports, and changes like haemorrhage, infarction, calcification, and hyaline degeneration were seen in 4 fibroids. Myomectomy added 15 minutes to the operating time and 1 day to the hospital stay but there was no significant postoperative complication. None of the patients had postoperative sepsis.

The limitations of this study are the small sample size and the retrospective nature of the study.

Conclusion

In conclusion, patient selection is crucial in Caesarean myomectomy. Large fundal intramural fibroids should be intuitively avoided. Intramural myomectomy should be performed with caution. Fibroids obstructing the lower uterine segment or accessible subserosal or pedunculated fibroids in symptomatic patients can be safely removed by experienced surgeons. The message is that what was once considered taboo should now be reconsidered.

Measures to minimise blood loss, like preoperative placement of uterine artery, balloon catheters, uterotonic drugs, uterine artery ligation, uterine tourniquets, stepwise devascularisation, and post-Caesarean uterine artery embolisation would optimise outcomes and significantly decrease the chance of hysterectomy. The time is right to recommend Caesarean myomectomy in selected patients in well-equipped tertiary settings, which could also have a positive bearing on future reproductive outcomes.

CONFLICT OF INTEREST

No funding was received for this study and the authors declared no conflict of interest.

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