OBSTETRICS

The impact of fibroid characteristics on pregnancy outcome

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OBJECTIVE: The objective of the study was to assess the influence of different characteristics of fibroids on pregnancy outcome.

STUDY DESIGN: We identified women with fibroids 4 cm or greater in size on ultrasonography at the dating scan between January 2002 and December 2012. The size (4-7 cm, 7-10 cm, >10 cm), number (multiple/single), location (lower uterus/body of uterus), and type (intramural, combination of intramural/subserosal, subserosal) were ascertained. Medical records were reviewed to obtain pregnancy outcomes (preterm delivery, birthweight, mode of delivery, estimated blood loss, postpartum hemorrhage, and admission for fibroid-related pain).

RESULTS: A total of 121 patients with 179 pregnancies were identified. Preterm delivery was more likely in those with multiple fibroids compared with single fibroids (18% vs 6%; $P = .05$). The location of the fibroid had an important effect on the mode of delivery with a higher cesarean section rate for fibroids in the lower part of uterus than in the body of the uterus (86% vs 40%; $P = .01$), a higher rate of postpartum hemorrhage (22% vs 11%; $P = .03$), and greater estimated blood loss (830 mL [SD, 551] vs 573 mL [SD, 383]; $P = .03$). Increasing size of fibroid was associated with greater rates of hemorrhage (11% vs 13% vs 36%; $P = .04$), increased estimated blood loss (567 mL [SD, 365] vs 643 mL [SD, 365] vs 961 mL [SD, 764]; $P = .01$), and higher rates of admissions for fibroid-related pain (5% vs 23% vs 21%; $P = .01$).

CONCLUSION: Different fibroid characteristics affect pregnancy outcome in varying ways. This information can be used to aid counseling women antenatally and in risk-stratifying patients.

Key words: fibroid, leiomyoma, pregnancy

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Fibroids, or leiomyomas, are benign tumours of the smooth muscle layer of the uterus. The precise etiology of fibroids is still unknown, but it is clear that estrogen and progesterone can cause growth.[1,2] They are common in women of child-bearing age and have an overall incidence of 40-60% by 35 years of age.[3]

Depending on the trimester of assessment and the size threshold, the prevalence of fibroids in pregnancy varies between 1.2% and 10.7%.[4-7] Visualization of fibroids in pregnancy can be problematic, partly because of the difficulty of ultrasonography in differentiating fibroids from physiological thickening of the myometrium.[4,8] It is therefore likely that the prevalence of fibroids in pregnancy is underestimated.

Although the majority of women with fibroids will have uneventful pregnancies, approximately 10-28% of women will develop complications, usually in the form of abdominal pain,[9-12] caused by fibroid red degeneration (necrosis of the fibroid as it overgrows its blood supply), torsion of pedunculated fibroids, or impaction.

There is conflicting evidence on the impact of fibroids on pregnancy, and the mechanism by which fibroids influence adverse obstetric outcome is not clearly understood. Some studies suggest that there is an increase in the rates of miscarriage, preterm labor/delivery, and hemorrhage.[13]

What is even less well described in the literature is the effect of size, number, location, and type of fibroid (ie, submucosal, intramural, or subserosal) on complications during pregnancy and obstetric outcome.

The aim of this study was to assess and evaluate the impact of different characteristics of large fibroids (defined as ≥4 cm) on pregnancy outcome.

Materials and Methods

This was a retrospective observational study of all pregnancies with uterine fibroids of 4 cm or greater detected on booking (first trimester) antenatal ultrasound performed by accredited sonographers at a major tertiary referral center (Queen Charlotte's and Chelsea Hospital) between January 2002 and December 2012. Data were extracted from the obstetric ultrasound database (Astraia, Munich, Germany). The size (4-7 cm, >7-10 cm, and >10 cm in the greatest dimension), location (lower uterus or body of uterus), and type (submucosal, intramural, subserosal, or varying combinations) of the fibroids as well as whether they were single or multiple (≥2 fibroids) were noted.

Obstetric and neonatal outcomes were ascertained from the maternity database and chart review. In particular, the rates of preterm delivery (<37 weeks), postpartum hemorrhage (PPH) (estimated blood loss of ≥1000 mL for cesarean and vaginal delivery), and

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antenatal admissions for abdominal pain because of fibroids were collected. The mode of delivery, estimated blood loss at delivery, and birthweight were additional outcome measures that were assessed. Because this study was part of a clinical audit, formal research ethics approval was not required.

Statistical analyses included the χ^2 test, Student *t* test, and analysis of variance. Significant differences were considered at a value of $P \leq .05$.

Results

During the study period, 197 patients were identified with fibroids of 4 cm or greater confirmed on ultrasound. Of these, data were available for only 121 patients with 179 pregnancies. There were 136 live births, 22 miscarriages, 7 ectopic pregnancies, 2 stillbirths, 3 terminations of pregnancy, and 9 unknown outcomes. Of the 121 patients, 66 patients (55%) were of African/Caribbean origin, 39 (32%) were white, and 16 (13%) were Asian.

Forty-nine patients (40%) had a single fibroid, whereas 72 patients (60%) had multiple fibroids. Fibroids were found to be subserosal in 30 patients (25%), intramural in 40 patients (33%), a combination of intramural and subserosal in 43 patients (35.5%), submucosal in 1 patient (0.8%), and undocumented in 7 patients (5.7%). Twenty-three patients (19%) were found to have fibroids in the lower uterus or on/adjacent to the cervix.

The median maternal age was 32 years (range, 20–46 years). The overall median gestation at birth was 39 weeks (range, 24–41 weeks). There were 18 preterm deliveries (less than 37 weeks) (13%). The median birthweight was 3.169 kg (range, 0.62–5.728 kg). There were 50 spontaneous vaginal deliveries (50 of 136, 37%), 17 instrumental deliveries (17 of 136, 13%), and 69 cesarean sections (69 of 136, 50%), of which 38 (55%) were elective and 31 (45%) were emergency cases.

The indications for elective cesarean sections included malpresentation (n = 6, 16%), multiple pregnancy (n = 2, 5%), previous cesarean section (n = 13, 34%), placenta previa (n = 4, 10%), macrosomia (n = 1, 3%), retroviral disease (n = 1, 3%), oligohydramnios (n = 1, 3%), and unknown in 3 cases (8%). The presence of fibroids as the primary indication for elective cesarean section occurred in only 7 cases (18%). The indications for emergency cesarean section included failure to progress (n = 14, 45%), fetal distress (n = 12, 39%), severe preeclampsia (n = 3, 10%), and unknown in 2 cases (6%).

The overall mean estimated blood loss was 636 mL (SD, 445 mL), and there were 19 cases of PPH (19 of 136, 14%). There were 15 admissions because of abdominal pain from fibroids (15 of 136, 11%).

TABLE 1
Relationship between number of fibroids and obstetric outcomes

Variable	Multiple fibroids (n = 85)	Single fibroid (n = 51)	*P* value
Mean birthweight, kg	3.00 (0.865)	3.18 (0.653)	> .5
Preterm labor, <37 of 40	15 (18%)	3 (6%)	.05
Mode of delivery			
SVD	30 (35%)	20 (39%)	.65
Cesarean section	46 (54%)	23 (45%)	.31
Instrumental	9 (11%)	8 (16%)	.38
PPH	13 (15%)	6 (12%)	.57
Mean EBL, mL	642 (426)	639 (480)	.2
Admissions because of fibroid pain	10 (12%)	5 (10%)	.72

Data shown are mean (SD) or number (percentage).

EBL, estimated blood loss; *n*, number of live births; *PPH*, postpartum haemorrhage; *SVD*, spontaneous vaginal delivery.

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Number of fibroids

Patients with multiple fibroids (defined as 2 or more fibroids) were significantly more likely to have a preterm birth compared with women with a single fibroid (18% vs 6%; $P = .05$) (Table 1). Although the rate of cesarean section was higher (55% vs 45%) in women with multiple fibroids compared with those with a single fibroid, this difference was not significant ($P = .31$). The mean birthweight was 3.00 kg (SD, 0.865 kg) in women with multiple fibroids compared with 3.18 kg (SD, 0.653 kg) in women with single fibroids, a difference that was again not significant ($P > .5$). The rate of PPH was similar between the 2 groups (15% (multiple fibroids) vs 12% (single fibroid, $P = .57$), as was the mean estimated blood loss between the 2 groups (642 mL [SD, 425 mL] vs 639 mL [SD, 480 mL]; $P > .2$). There were similar rates of admissions (12% vs 10%; $P = .72$) because of fibroid-related abdominal pain.

Location of fibroids within the uterus

There was no difference in mean birthweight with different locations of the fibroid (Table 2). The location of fibroid [T2] (lower uterus/cervix vs body of uterus) did not have a statistically significant impact on the rate of preterm delivery (8% vs 14%; $P = .5$). However, cases in which the fibroids were in the lower part of the uterus were significantly more likely to have a cesarean section (86% vs 40%; $P = .01$). Of those women with lower uterine fibroids who had a cesarean section, 8 of 26 (31%) had an emergency cesarean section and 18 of 26 (69%) had elective cesarean sections (4 because of fibroids, 6 of malpresentation, 5 for previous caesarean section, 2 for placenta previa, and 1 for multiple pregnancy). [T1]

The mean estimated blood loss was higher in those women with fibroids in

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