ORIGINAL ARTICLE

Factors influencing the mode of delivery and associated pregnancy outcomes for twins: a retrospective cohort study in a public hospital

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Objectives To determine current trends for different modes of delivery in twin pregnancies, factors affecting the mode of delivery, and associated outcomes.

Design Retrospective cohort study.

Setting A public hospital in Hong Kong.

Participants All twin pregnancies booked at Kwong Wah Hospital during a 3-year period from 1 April 2006 to 31 March 2009.

Results Of 197 sets of twins, 35 (18%) were delivered vaginally and 162 (82%) by caesarean section (47% were emergencies and 53% elective). In all, 32 (37%) of the elective and 21 (28%) of the emergency caesarean sections were in response to maternal requests. Vaginal delivery was more common in mothers with a history of vaginal delivery and monochorionic diamniotic twins. Women who conceived by assisted reproduction or those who had a tertiary education were more likely to deliver by caesarean section. The type of conception and the presentation of the second twin were statistically significant factors affecting maternal choice on the mode of delivery. Maternal age did not affect the choice of delivery mode. Except for the higher frequency of sepsis and cord blood acidosis in second twins delivered vaginally, there were no significant differences in neonatal morbidity between the groups that attempted vaginal delivery or requested caesarean sections. All the women who had compression sutures or hysterectomy to control massive postpartum haemorrhage were delivered by caesarean section.

Conclusion A high caesarean section rate observed in our cohort was associated with maternal requests for this mode of delivery. The type of conception and the presentation of the second twin were statistically significant factors affecting maternal choice on mode of delivery. Women's requests for caesarean delivery out of the concern for their babies are not supported by current evidence. In response to a woman with a twin pregnancy requesting caesarean delivery, the pros and cons of vaginal deliveries and caesarean sections should be fully explained before the woman's autonomy is respected.

Key words
Cesarean section; Delivery, obstetric; Pregnancy, multiple; Reproductive techniques, assisted; Twins

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New knowledge added by this study

- A high caesarean section rate for twin pregnancies was associated with maternal requests for this mode of delivery.
- There were no significant differences in major neonatal morbidity between the groups who attempted vaginal delivery or requested caesarean sections.

Implications for clinical practice or policy

- In response to a woman with a twin pregnancy requesting caesarean delivery, the pros and cons of vaginal deliveries and caesarean sections should be fully explained before the woman's autonomy is respected.

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Introduction

Increasing numbers of twin births have been observed worldwide, mainly because of increasing recourse to assisted reproductive techniques.[1,2] Twins account for 1 to 3% of all pregnancies. However, they account for approximately 10% of all perinatal mortality,

影響雙胎分娩方式及妊娠結果的因素：一所公立醫院的回顧隊列研究

目的 探討目前雙胎妊娠分娩方式的趨勢、影響分娩方式的因素及有關的妊娠結果。

設計 回顧隊列研究。

安排 香港一所公立醫院。

參與者 於2006年4月1日至2009年3月31日期間所有在廣華醫院預約分娩並懷有雙胎的婦女。

結果 共有197對雙胎在研究期間分娩，35對（18%）經陰道自然分娩，162對（82%）剖腹產，其中47%為緊急剖腹產，另53%為選擇剖腹產。選擇剖腹產中的32對（37%）以及緊急剖腹產中的21對（28%）都是按產婦的要求而進行的。曾有經陰道分娩經驗和單絨毛膜雙羊膜雙胞胎的產婦普遍採納經陰道自然分娩，而經輔助生殖或曾受大學教育的產婦較大機會選擇剖腹產。影響產婦對分娩方式的選擇包括是否自然妊娠或經輔助生育而懷孕，以及第二胎兒是否頭頂先露；兩者均達統計學意義。相反，產婦年齡並未影響她們對分娩方式的選擇。除了敗血症和臍血酸中毒在自然分娩中第二胎發生的比率較高外，經陰道分娩和剖腹產兩組的新生兒發病率並無顯著差異。所有須進行子宮捆紮或子宮切除以治療術後大量出血的均為剖腹產的產婦。

結論 本隊列研究中的高剖腹產率與產婦的要求相關。產婦是否自然妊娠或經輔助生育而懷孕，以及第二胎兒是否頭頂先露明顯影響產婦對分娩方式的選擇。因關注胎兒而令產婦選擇剖腹產的分娩方式並未受到目前實證支持。如果懷有雙胎的產婦選擇剖腹產，在尊重她們意願的同時，亦應該向她們全面解釋經陰道自然分娩和剖腹產各自的利弊。

mainly due to preterm delivery.[3] Management of the second twin in labour is a major challenge obstetricians face. The optimal mode of delivery for twin pregnancies is not yet established. There is an ongoing 'twin birth study' comparing outcomes of planned vaginal births and planned caesarean sections with first twin in cephalic presentation (between 32 and 38 weeks of gestation). The mode of delivery for twin pregnancies may be greatly affected by the results of the 'twin birth study' if it shows that planned caesarean sections confer better outcomes, but even before its results are available, the skills for twin vaginal delivery are already vanishing.[4]

For twin pregnancies, in most countries the average caesarean section rate is about 50%.[1,2,5,6] There has been an increasing trend of the caesarean delivery rate for twin pregnancies in Australia,[7] as well as in our centre, where it has gradually increased from 51% in 2001 to 66% in 2005, and to 86% in 2009.

High caesarean section rates were observed both in twin and singleton pregnancies conceived by assisted reproductive techniques.[5,8-11] For twin pregnancies conceived by assisted reproduction, it ranged from 68 to 95%,[5,8-10] which is higher than the caesarean section rate of about 50% for twin pregnancies conceived spontaneously.[1,6] In a meta-analysis comparing planned vaginal birth and planned caesarean section, parity was found to differ among women having planned vaginal deliveries or planned caesarean sections. One study showed that the mean maternal age was higher in the planned caesarean section group, but in other reports the mean gestational age and mean maternal age were similar in both groups.[12]

Assisted reproduction and in particular in-vitro fertilisation (IVF) has become a widespread option for managing subfertility. Mothers of IVF-conceived twins experienced significantly higher levels of maternal stress than those who conceived spontaneously.[13] It is possible for mothers with twin pregnancies resulting from assisted reproductive techniques prefer caesarean delivery out of anxiety, which may be one reason for the high caesarean section rate observed.

In Kwong Wah Hospital, all the twin pregnancies are followed up in a dedicated twin pregnancy clinic. This study aimed to examine current trends for the mode of delivery in twin pregnancies in our centre, and identify factors that affect the choice. The pregnancy outcomes were also studied as secondary endpoints which could be useful for future counselling.

Methods

All the twin pregnancies booked in Kwong Wah Hospital are recorded in a twin pregnancy clinic registry. The pregnancies are then followed up in a specialised twin pregnancy clinic by a dedicated team of obstetricians and midwives. The team of obstetricians was specialised in maternal fetal medicine. Follow-up intervals were guided by the departmental protocol (available from the corresponding author). Ultrasound examinations were performed on monochorionic twins every 2 to 3 weeks until 30 weeks of gestation, and subsequently at each visit. For dichorionic twins, monthly ultrasound examinations were performed from booking till 30 weeks, and subsequently at each visit. When approaching term, the responsible obstetrician in the twin clinic discussed the mode of delivery with the mother and her partner (if available). There was no standardised information regarding the risks of caesarean section or vaginal delivery. For uncomplicated dichorionic diamniotic (DCDA) and monochorionic diamniotic (MCDA) twin pregnancies, vaginal delivery was considered an appropriate option if the first twin was in a cephalic presentation. If the woman strongly requested

caesarean section, her choice was respected. For all monochorionic monoamniotic (MCMA) twin pregnancies, caesarean section was recommended.

All twin pregnancies booked at Kwong Wah Hospital during the 3-year period from 1 April 2006 to 31 March 2009 were identified from the twin pregnancy clinic registry. Antenatal clinical notes, in-patient clinical notes, and computer records of the women and their babies were reviewed in detail. For women who did not deliver in our unit, they were contacted upon defaulting follow-up, and the mode of delivery was recorded in the clinical notes. The notes and records were reviewed by one of the four investigators involved in the study with agreement of definitions used in data entry to avoid discrepancy during interpretation. A detailed data entry form was filled in for each set of twins on maternal demographic data, medical history, obstetric history, type of conception, antenatal and intrapartum complications, fetal presentations, mode of delivery, placental chorionicity, as well as neonatal and maternal outcomes. Neonatal outcome included birth weight, gender, gestation at delivery, Apgar scores, cord blood pH, neonatal intensive care unit (NICU) admission, duration of NICU stay, birth trauma, and neonatal morbidity. Neonatal morbidity was defined as respiratory morbidity, sepsis, or neonatal jaundice. Respiratory morbidity included respiratory distress syndrome, transient tachypnoea of the newborn, apnoea of prematurity, or pneumothorax. Sepsis included those with clinical sepsis, cellulitis or necrotising enterocolitis. Maternal outcome included blood loss, receipt of a blood transfusion, having compression sutures or hysterectomy to control postpartum haemorrhage.

As only two pairs of twin had involved vaginal delivery of the first twin and then emergency caesarean section for the second twin, this cohort was analysed with respect to the mode of delivery of the first twin, which was either vaginal, emergency caesarean section, or elective caesarean section. In the two pairs of twin in which the second twin was delivered by emergency caesarean section, the vaginally delivered first twin did not undergo neonatal resuscitation or NICU admission. Moreover, the second twins did not endure neonatal morbidity except jaundice or hypoglycaemia. Cord blood pH of the two second twins were 7.01 and 7.26. Women who had no medical indication for caesarean section were considered fit for vaginal delivery. They were further analysed in two groups: one for whom vaginal delivery was attempted, and the other for whom caesarean section was requested. The group of attempted vaginal delivery included all women delivered vaginally and those who had emergency caesarean section due to failed induction, no progress of labour, and non-reassuring fetal status. The purpose was to evaluate factors affecting the women's decisions on the mode of delivery.

Statistical analysis was performed using the Statistical Package for the Social Sciences (Windows version 11.5; SPSS Inc, Chicago [IL], US). Differences between categorical variables were analysed using the Chi squared test. Differences between continuous variables were tested with one-way analysis of variance. Logistic regression was used to evaluate the relationship between education, history of vaginal delivery, type of conception, chorionicity and presentation of the second twin, and the mothers' choice to attempt vaginal delivery or request caesarean section.

Approval of the study was granted by the local research ethics committee.

Results

There were 215 sets of twins booked in our unit between 1 April 2006 and 31 March 2009, but we

TABLE 1. Demographic characteristics and mode of delivery (n=197)*

Characteristic	Mean ± standard deviation, or No. (%)			P value
	Vaginal delivery (n=35)	Emergency CS (n=76)	Elective CS (n=86)	
Age (years)	30.6 ± 5.4	31.6 ± 3.6	32.0 ± 4.0	0.234
Maternal height (cm)	158.6 ± 4.7	158.4 ± 5.7	159.2 ± 5.5	0.633
Maternal weight (kg)	53.3 ± 6.6	55.3 ± 7.9	54.7 ± 6.7	0.396
Maternal BMI (kg/m^2)	20.2 ± 2.0	21.2 ± 2.9	20.7 ± 2.1	0.114
Pre-pregnant body weight (kg)	51.0 ± 6.2	53.0 ± 7.1	52.2 ± 5.5	0.295
Total weight gain (kg)	16.0 ± 5.9	17.2 ± 5.4	17.67 ± 4.7	0.285
Parity				
0	20 (57)	57 (75)	67 (78)	0.058
≥1	15 (43)	19 (25)	19 (22)	-
Cigarette smoking	4 (11)	8 (11)	5 (6)	0.459

* CS denotes caesarean section, and BMI body mass index

TABLE 2. Indications for caesarean sections*

Indication†	No. (%)	
	Elective CS (n=86)	Emergency CS (n=76)
Patient's request	32 (37)	21 (28)
Malpresentation	23 (27)	12 (16)
IUGR	13 (15)	7 (9)
PIH / PET / gestational proteinuria / eclampsia	3 (3)	5 (7)
Placenta praevia	2 (2)	2 (3)
Others	2 (2)	3 (4)
Previous CS	8 (9)	9 (12)
Non-reassuring fetal status	0	5 (7)
Failed induction	0	3 (4)
No progress of labour	0	4 (5)
Placenta abruption	0	2 (3)
Vasa praevia	0	1 (1)
MCMA twin	1 (1)	0
Uterine scar not due to previous caesarean section	1 (1)	1 (1)
Cord prolapse	0	1 (1)
Not available	1 (1)	0
Total	**86**	**76**

* CS denotes caesarean section, IUGR intrauterine growth restriction, PIH pregnancy-induced hypertension, PET pre-eclampsia, and MCMA monochorionic monoamniotic

† If there was more than one indication for CS, only that leading to the immediate decision was counted

were only able to trace the records of 210 sets, because five of them did not show up at the first booking clinic. Of the 210 sets of twins, review of records was complete in 197 (94%) of them; 13 had delivered in other units or in China and could not be contacted, and thus their mode of delivery was unknown. Maternal age, height, weight, body mass index, pre-pregnant body weight, total weight gain during pregnancy, parity, and cigarette smoking are shown in Table 1, according to the three pre-defined groups (vaginal delivery, emergency caesarean section, or elective caesarean section). There were no statistically significant differences between the three groups with respect to these demographic variables.

Among the 197 pairs of twins, 177 (90%) delivered in Kwong Wah Hospital, whereas 15 (8%) were delivered in other Hospital Authority hospitals. Among the latter, five (33%) were delivered vaginally, seven (47%) by emergency caesarean sections, and three (20%) by elective caesarean sections. The remaining five (3%) were delivered in private hospitals by elective caesarean sections. Thus, of the 197 sets of twins, 35 (18%) were delivered vaginally and 162 (82%) by caesarean section of which 76 (47%) were emergency procedures and 86 (53%) were elective. In our unit, the background caesarean section rate for all deliveries between 2006 and 2009 was 22%. Regarding the 197 women with twins, 97 were delivered by caesarean section due to medical indications, and 100 were considered fit for vaginal delivery. Among the latter, 47 (47%) attempted vaginal delivery and 53 (53%) requested caesarean section. All the women who requested caesarean section made their decision antenatally. Of the 47 women who attempted vaginal delivery, 35 (74%) delivered

TABLE 3. Factors associated with the mode of delivery*

Factor	No. (%)			P value
	Vaginal delivery (n=35)	Emergency CS (n=76)	Elective CS (n=86)	
History of vaginal delivery				
No	21 (13)	66 (41)	75 (46)	0.001
Yes	14 (40)	10 (29)	11 (31)	
Type of conception				
Spontaneous conception	29 (25)	48 (41)	41 (35)	0.002
Assisted reproduction	6 (8)	28 (35)	45 (57)	
Maternal education				
Primary	0	6 (100)	0	0.005
Secondary	26 (23)	41 (36)	47 (41)	
Tertiary	8 (11)	27 (37)	38 (52)	
Chorionicity				
DCDA	14 (12)	47 (40)	56 (48)	0.02
MCDA	18 (28)	25 (39)	22 (34)	
Presentation of second twin				
Cephalic	27 (23)	46 (39)	45 (38)	0.001
Non-cephalic	2 (3)	27 (42)	36 (55)	

* CS denotes caesarean section, DCDA dichorionic diamniotic, and MCDA monochorionic diamniotic

TABLE 4. Factors associated with choosing vaginal delivery

Factor	Maternal choice of delivery, No. (%)		P value	Odds ratio*	95% Confidence interval*
	Attempted vaginal delivery	Requested for caesarean section			
History of vaginal delivery	15/47 (32)	8/51 (16)	0.225	1.47	0.10-1.73
Spontaneous conception	39/47 (83)	23/51 (45)	0.013	6.16	1.46-25.24
Education (tertiary or above)	12/46 (26)	20/49 (41)	0.120	2.42	0.77-9.82
Chorionicity: MCDA†	22/44 (50)	10/47 (21)	0.327	0.96	0.14-1.94
Presentation of second twin: cephalic	38/41 (93)	24/48 (50)	<0.001	13.21	3.78-84.94

* Obtained after multinominal logistic regression analysis

† MCDA denotes monochorionic diamniotic

vaginally, and the remaining 12 (26%) were delivered by emergency caesarean section.

The most common reason for caesarean section was the patient's request, both for elective and emergency procedures (Table 2). The second and third most common reasons were malpresentation and intrauterine growth restriction, respectively (Table 2). Vaginal delivery was more common in mothers with a history of vaginal delivery, of which the difference was statistically significant (P=0.001; Table 3). Approximately 40% of the twin pregnancies were conceived by assisted reproductive techniques. The rate of caesarean section was significantly higher in this group (Table 3). Caesarean section was also significantly more common in mothers with a tertiary education (Table 3). Chorionicity was confirmed by pathological assessment of the placenta. When analysing the chorionicity and mode of delivery, MCMA twins were excluded as all of them would have been delivered by caesarean sections. When comparing MCDA with DCDA twins, significantly more of the former were delivered vaginally. When the second twin was in a non-cephalic presentation, emergency or elective caesarean sections were significantly more common.

The 100 women who were fit for vaginal delivery were further analysed using binary logistic regression to determine the factors associated with choosing vaginal delivery (Table 4). The type of conception and the presentation of second twin were statistically significant factors affecting maternal choice. More women requested caesarean section if they were conceived by assisted reproductive techniques. If the second twin was in cephalic presentation, more women wanted to attempt vaginal delivery. Maternal age was analysed with reference to the attempted vaginal delivery group and those requesting caesarean section, but there was no significant difference in maternal age based on univariate analysis, hence it was not included in the multivariate analysis.

Neonatal outcomes after different modes of delivery are outlined in Table 5. Both the first and second twins were significantly heavier when delivered by elective caesarean section. Significantly more second twins, who were small-for-gestational age, were delivered by elective caesarean section. There was no significant difference between gender and Apgar scores at the 5th minute of babies delivered by different delivery modes. Both first and second twins were more likely to be admitted to a NICU when delivered vaginally or by emergency caesarean section. The number of days spent in the NICU in the two groups was not statistically different. When the babies were delivered preterm (<32 weeks), significantly more of them were delivered vaginally. There was no significant difference in birth trauma in twins delivered by vaginal or caesarean delivery. Unexpectedly, there was one case of fractured femur in a first twin during an elective caesarean section for breech presentation. For both the first and second twins, significantly more babies suffered from respiratory morbidity in the vaginal group. However, after adjusting for gestational age at delivery with multivariate logistic regression, the difference became insignificant.

When neonatal outcome was compared between the two groups (attempted vaginal delivery or requested caesarean delivery), there was no significant difference in the gender of the babies, Apgar score at 5th minute, NICU admissions or birth trauma (Table 5). Both first and second twins were significantly heavier when delivered by caesarean sections. All women when delivered preterm at less than 32 weeks, attempted and delivered vaginally. The frequency of respiratory morbidity and neonatal jaundice were not significantly different in the two groups. Regarding the second twin, all those who suffered from sepsis had a cord blood pH of <7.2 when delivered vaginally. Data on the second twins in the group attempting vaginal delivery were further analysed. Multivariate logistic regression was not performed to assess the effect of preterm delivery before 32 weeks on sepsis and cord blood pH of <7.2, because all of them belonged to one group. However, 16% of those delivered preterm (<37 weeks) were associated with sepsis, while only 5%

TABLE 5. Neonatal outcomes*

Outcome	Mean ± standard deviation, or No. (%)			P value	Mean ± standard deviation, or No. (%)		P value
	Vaginal delivery (n=35)	Emergency CS (n=76)	Elective CS (n=86)		Attempted vaginal delivery (n=47)	Requested for CS (n=51)	
1st Twin birth weight (kg)	2.2 ± 0.7	2.3 ± 0.5	2.5 ± 0.4	0.002	2.3 ± 0.7	2.5 ± 0.3	0.044
2nd Twin birth weight (kg)	2.1 ± 0.6	2.2 ± 0.5	2.4 ± 0.4	0.003	2.2 ± 0.5	2.4 ± 0.3	0.004
1st Twin gender							
Male	17 (53)	32 (42)	45 (55)	0.249	19 (43)	22 (44)	0.936
Female	15 (47)	44 (58)	37 (45)		25 (57)	28 (56)	
2nd Twin gender							
Male	13 (45)	36 (48)	44 (53)	0.696	17 (42)	23 (46)	0.664
Female	16 (55)	39 (52)	39 (47)		24 (58)	27 (54)	
1st Twin							
Cord blood pH <7.2	2 (8)	7 (11)	1 (1)	0.063	1 (2)	0	0.295
2nd Twin					46 (98)	51 (100)	
Cord blood pH <7.2	5 (19)	5 (8)	1 (1)	0.005	2 (4)	0	0.137
1st Twin Apgar score at 5th min					45 (96)	51 (100)	
≤4	0	2 (3)	0	0.200			
>4	35 (100)	74 (97)	86 (100)		1 (2)	0	0.295
≤7	0	5 (7)	0	0.017	46 (98)	51 (100)	
>7	35 (100)	71 (93)	86 (100)		1 (2)	0	0.295
2nd Twin Apgar score at 5th min					46 (98)	51 (100)	
≤4	1 (3)	1 (1)	0	0.344			
>4	34 (97)	75 (99)	86 (100)		4 (11)	3 (7)	0.499
≤7	1 (3)	2 (3)	0	0.306			
>7	34 (97)	74 (97)	86 (100)		8 (22)	0	0.001
1st Twin NICU admission							
Yes	8 (27)	18 (26)	5 (6)	0.003	10 (24)	6 (13)	0.162
2nd Twin NICU admission							
Yes	7 (26)	14 (21)	4 (5)	0.005	7 (18)	4 (8)	0.180
1st Twin NICU stay (No. of days)	14.0 ± 12.0	11.7 ± 11.9	19.0 ± 12.5	0.49	13.2 ± 11.2	11.4 ± 7.9	0.194
2nd Twin NICU stay (No. of days)	11.4 ± 7.9	11.6 ± 10.2	18.2 ± 11.7	0.42	6.2 ± 1.1	6.3 ± 1.3	0.236
Gestation at delivery							
<32 weeks	6 (17)	4 (5)	2 (2)	0.008	6 (13)	0	0.008
1st Twin birth trauma							
Yes	2 (7)	0	1 (1)	0.057	2 (5)	0	0.126
2nd Twin birth trauma							
Yes	0	1 (2)	0	0.457	0	0	N/A
1st Twin neonatal morbidity							
Respiratory morbidity	6 (20)	12 (17)	4 (5)	0.031	6 (14)	4 (8)	0.370
Sepsis	3 (10)	9 (13)	3 (4)	0.129	5 (12)	2 (4)	0.171
Neonatal jaundice	6 (20)	17 (25)	8 (10)	0.67	7 (17)	7 (15)	0.786
2nd Twin neonatal morbidity							
Respiratory morbidity	7 (26)	13 (19)	6 (8)	0.033	8 (21)	5 (10)	0.189
Sepsis	3 (11)	4 (6)	1 (1)	0.088	4 (10)	0	0.023
Neonatal jaundice	5 (19)	8 (12)	9 (11)	0.606	5 (13)	7 (15)	0.813

* CS denotes caesarean section, NICU neonatal intensive care unit, and N/A not applicable

TABLE 6. Maternal outcomes*

Maternal outcome	Mean ± standard deviation, or No. (%)			P value	Mean ± standard deviation, or No. (%)		P value
	Vaginal delivery (n=35)	Emergency CS (n=76)	Elective CS (n=86)		Attempted vaginal delivery (n=47)	Requested for CS (n=51)	
Blood loss (mL)	447 ± 252	511 ± 377	612 ± 1262	0.608	495 ± 389	690 ± 1569	0.434
Blood transfusion							
Yes	3 (10)	8 (11)	3 (4)	0.21	5 (12)	2 (4)	0.182
Compression suture							
Yes	0	2 (3)	2 (3)	0.655	1 (2)	2 (4)	0.623
Hysterectomy							
Yes	0	0	1 (1)	0.523	0	1 (2)	0.341

* CS denotes caesarean section

delivered after 37 weeks suffered from sepsis. The result was tested with Chi squared test but the effect of preterm delivery on sepsis of the second twin was not statistically significant.

Maternal outcomes are outlined in Table 6. There was no statistically significant difference in blood loss and blood transfusion rate between the three groups of vaginal delivery, emergency and elective caesarean sections. All the women received compression sutures or had a hysterectomy to minimise postpartum haemorrhage after caesarean section, though the difference was not statistically significant.

Regarding those who chose to attempt vaginal delivery and those requested caesarean delivery, maternal outcomes were not significantly different (Table 6). Only one patient (in the group requesting caesarian section) had a hysterectomy to control massive postpartum haemorrhage. Two out of three of those treated by compression sutures to control massive haemorrhage also belonged to this group. The remaining patient opted to attempt vaginal delivery but underwent emergency caesarean section for non-reassuring fetal status.

Discussion

Approximately 82% of the twins in our unit were delivered by caesarean sections, which is more frequent than elsewhere. The caesarean section rate for twin pregnancies in the UK was 55%, in Israel it was 46%, and in Greece it was 77%.[1,5,9] When analysing the proportion of twin pregnancies resulting from assisted reproductive techniques, a higher proportion of such women had caesarean sections. The proportion of twin pregnancies associated with assisted reproduction was 18% in the UK, 22% in Israel, and 33% in Greece.[1,5,9] The proportion of twin pregnancies from assisted reproduction in our cohort was even higher (40%), which was consistent with anticipated trends. The most common indication for caesarean section in our cohort was the patient's request; 37% of all elective caesarean sections and 28% of all emergency caesarean sections were for this reason and appeared to account for the disproportionately high caesarean section rate in our cohort.

In our cohort, the statistically significant factors affecting women's choice between trial of vaginal delivery and request for caesarean section were the type of conception and presentation of the second twin. Women who underwent maternal-request caesarean delivery most commonly did so due to concerns about the baby.[14] If the second twin was in a non-cephalic presentation, women probably had more anxiety about the safety of vaginal delivery. Understandably, women carrying twin pregnancies conceived by assisted reproduction have more concern for their babies, owing to difficulties encountered during conception. Other studies have also observed the same phenomenon and reported higher levels of satisfaction when women played an active role in the decision.[14,15] Other reasons for requesting a caesarean delivery included fear of pain, fear of loss of control, not coping with the uncertainty of timing and/or convenience, as well as fear of future problems (prolapse or incontinence).[14] These data further rationalise the motivation for requesting caesarean delivery in the group of women conceived by assisted reproduction. This group of mothers had already been waiting to welcome a new member into the family for a long time, and could not afford to lose control at this very important time of their lives. More women also requested caesarean section if the second twin was non-cephalic in presentation.

In our cohort, there was no major statistically significant difference in neonatal outcomes in the groups who attempted vaginal delivery or caesarean section, except for the higher frequency of sepsis and cord blood acidosis of the second twin. There were more preterm deliveries in those attempting vaginal delivery. There was also a trend towards increased sepsis after preterm delivery, which is an anticipated observation as underlying infection

could be a cause of preterm labour. In our series, however, the numbers were too small to reach statistical significance. Prematurity also explains why both the first and second twins are more likely to be admitted to NICUs when delivered vaginally. The higher incidence of cord blood acidosis in the second twin is also expected with vaginal delivery, owing to the delayed delivery of the second twin. It is known that there was a significant negative correlation between the twin-to-twin delivery interval and umbilical cord blood pH.[16] The association between acid-base 'disturbance' in umbilical cord blood and neonatal outcome has been challenged, as metabolic acidaemia at birth is not uncommon (2% of all births) and the vast majority of such infants do not develop cerebral palsy.[17,18] We were not able to conclude whether neonatal outcome is affected by the mode of delivery from our study due to its retrospective design and small sample size. Such data on neonatal outcomes, however, represent experience in our local unit and could be useful for future counselling. A recent meta-analysis found no statistically significant increase in neonatal morbidity when the baby was delivered vaginally as opposed to resorting to planned caesarean section.[19] Women's concern about the safety of their babies when delivered by vaginal delivery is actually not substantiated by current evidence. Results from multicentre, randomised studies are still awaited to assess the optimal mode of delivery for twin pregnancies.

Caesarean section is not without risk. Not only is it associated with increased short-term adverse maternal outcomes (including maternal mortality and morbidity),[20,21] it also leads to long-term complications, especially increased risk placenta praevia, accreta or placental abruption in future pregnancies.[22-25] Our study also suggested that women delivered by caesarean section might have more short-term complications; cases of massive postpartum haemorrhage treated by compression stitches or hysterectomy were all delivered by caesarean section. We were unable to demonstrate any statistically significant difference owing to the small sample size in our series.

For every woman requesting caesarean delivery, responsible obstetricians should discuss the risks and benefits of planned vaginal delivery and caesarean section. Caesarean delivery is associated with increased short-term morbidity and long-term risks (during future pregnancies). Literature review reveals no current evidence showing increased neonatal morbidity for planned vaginal delivery, so long as the first twin is in a cephalic presentation. Many women may not contemplate future pregnancies if they are already carrying two, especially when the multiple is the result of assisted reproduction. If the risks are fully explained, it is nevertheless reasonable to respect the mother's autonomy.

Conclusion

The majority of twin pregnancies in our unit were delivered by caesarean section. Although most were performed for a medical indication, a significant proportion was in response to maternal requests. Based on binary logistic regression, the factors affecting maternal decisions on the mode of delivery were the type of conception and presentation of the second twin. The group of women who conceived by assisted reproductive techniques were significantly more likely to request for caesarean delivery. Women's requests for caesarean delivery out of the concern of their babies are not supported by current evidence. Local experience only showed increased sepsis and cord blood acidosis of the second twin when delivered vaginally, which could be related to their preterm delivery. Notably, 75% of women who attempted vaginal delivery delivered vaginally. For a woman with a twin pregnancy requesting caesarean delivery, the pros and cons of vaginal delivery and caesarean section should be fully discussed before the woman's autonomous choice is respected.

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