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CAESARIAN SECTION RATES AND PERINATAL OUTCOME AT THE AGA KHAN UNIVERSITY HOSPITAL, NAIROBI

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ABSTRACT

Background: **There has been a persistent rise in the rate of Caesarean sections over the years. Whether this rise is the cause of the decline in infant mortality and improved neonatal outcome still remains debatable.**

Objective: **To compare the Caesarian section rate and the perinatal outcome at the Aga Khan University Hospital for the years 2001 and 2004.**

Design: **Retrospective study.**

Setting: **The Aga Khan University Hospital, Nairobi.**

Main outcome measures: **The total Caesarian section rates, their indication and the perinatal outcome.**

Results: **The overall Caesarian section rate was 20.4% in 1996, 25.9% in 2001 and 38.1% in 2004. The rate among patients managed by their private obstetricians was 27.1% in 1996, 30.8% in 2001 and 41.7% in 2004. Whilst among general patients, it was 14.7%, 21.5% and 34.5% over the same period. The main indication for emergency Caesarian section was foetal distress, while that for elective Caesarian section was a previous uterine scar. The overall perinatal mortality rate improved from 25.2 per 1,000 births in 2001 to 14.0 per 1,000 births in 2004 (P< 0.001, 95%CL 8.58-30.62). The early neonatal mortality rate was 12.8 per 1,000 live births in 2001 compared to 10.8 per 1,000 live births in 2004 (p=0.08, 95%CI 9.84-13.76).**

Conclusion: **There has been a significant increase in Caesarian section rate over the years. Being a referral unit dealing with many high-risk patients some of whom are supervised elsewhere and with a significant ratio of private patients, the high rate of Caesarean section at the Aga Khan University Hospital is expected. The rise could also be due to early detection of foetal compromise and improved diagnostic facilities leading to timely intervention. However, there has been a significant improvement in the neonatal outcome over the same period of time. Whether this is an effect of the high Caesarean section rate is debatable and calls for further research to correlate the two.**

INTRODUCTION

In the past 20 years, the rate of Caesarian sections has increased significantly. The reasons vary from increasing avoidance of instrumental assisted delivery, the current delivery of all breech by Caesarian section (1), early detection of foetal jeopardy by cardiotocography and ultrasonography, prevention of mother to child transmission of HIV, increasing demand for abdominal delivery and avoidance of trial of scar. A frequently quoted World Health Organisation consensus statement examined Caesarian section rates and maternal and perinatal mortality in a number of countries and concluded

that there is no additional health benefits associated with a Caesarian section rate above 10% to 15% (2). Although infant mortality has declined over the years, there is little evidence that more frequent Caesarian births are the cause. Chile and Brazil have the highest Caesarian section rates in the world (40 and 37%, respectively) yet their maternal and neonatal outcomes are not comparable to countries like Sweden, Belgium and Ireland who have low Caesarian section rate of between 5-12% (3,4). Many other studies have similarly showed little improvement in perinatal outcome with Caesarian section (5-7).

The maternal mortality rate associated with Caesarian section varies from 4.8 per 10,000 deliveries. In one series, the risk of death was found to be 26 times greater in vaginal deliveries (8). The perinatal case fatality rates associated with Caesarean section also vary locally from, 36.6 per 1000 to 142 per 1000 (9-13).

However, the use of crude perinatal mortality rates may mask any benefit from Caesarian section, as the main contributors to crude perinatal mortality rates i.e. lethal anomalies and low birth weight, are not readily amenable to obstetric intervention and unlikely to be affected by Caesarian section (6,7). This study compares the Caesarian section rate for the year 2001 and 2004 and the perinatal mortality over the same period.

MATERIALS AND METHODS

The Aga Khan University Hospital, Nairobi is a 254-bed tertiary care facility and a teaching hospital for post graduate medical students and advanced nursing programmes. The obstetric unit is responsible for over 8000 out-patient visits and 2000 deliveries each year. The ante-natal outpatient clinics run one booking clinic with 20 new clients seen weekly and two regular clinics with 135 patients attending weekly. The clinics serve clients from different races, cultural and religious backgrounds in the East and Central African region. The clinics are conducted by two consultants, three registrars, four senior house officers and one intern besides registered nurses/ midwives, orderlies and counselors. Deliveries are conducted in either the maternity wing of the main hospital or a labour delivery recovery (LDR) facility in the Princess Zahra Pavilion. Both units are well staffed and have well equipped nurseries attached with a neonatal ICU and HDU in the main maternity. There is one maternity theatre that is well equipped to handle emergencies, elective cases are usually operated from the main theatres which are five in total.

There are two categories of patients attended to at the hospital. Those admitted and attended to by their personal doctors, referred to as private patients and those taken care of by a team of resident doctors comprising of departmental registrars and senior house officers headed by a team of consultants. The latter group is referred to as general patients.

A retrospective study was undertaken to determine the Caesarian section rate for the years 2001 and 2004. The labour ward records for these two years were perused and analysed. Eligible for inclusion in the study were all those mothers who delivered at the hospital in 2001 and 2004 regardless of primary obstetrician attending to them. An earlier audit in 1996 and 2001 by Osur *et al* (16) was compared with the 2004 audit. The total number of infants after 28 weeks gestation or weighing more than 500gms in the years under review was used to establish the perinatal and early neonatal mortality rates.

The patients' records were retrieved and the mode of delivery and indications for any interventions undertaken and the perinatal outcome were noted.

Each year the Caesarian section rate used was the percentage of all mothers delivered by Caesarian section. Low birth weight refers to babies of less than 2.5 kg at birth and the percentage of low birth weight refers to the percentage this group form of all babies born weighing more than 500gms.

Statistical analysis was carried out using the statistical package, SPSS 11.5 for windows. Descriptive statistics, tabulations and graphs were used to demonstrate the data and correlations were carried out to compare variables.

Ethical issues: Confidentiality of patient data were maintained and their names did not appear in our data. No mention was made to any particular doctor or care giver involved in the decisions made to the patients.

There is no conflict of interest declared in this study. In no way has the judgment of the authors been influenced by any party.

RESULTS

There were a total of 1,588 and 2,142 deliveries in the years 2001 and 2004 respectively. Of these 412 and 817 were Caesarian sections births translating to an overall rate of 25.9% and 38.1% respectively. There was a significant difference in the rate of Caesarean section in the hospital between these two years (p <0.001, 95%CI 28.16-35.84). The total Caesarian section rate has continued to steadily increase among private patients as well as general patients. This has been 30.8% and 41.7% among private patients (p<0.001, 95%CI 25.33-46.97) and 21.5% and 34.5% among general patients (p<0.001 95% CI 15.22-40.78) for 2001 and 2004.

The rates have consistently remained higher among private patients compared to general patients yet there is no significant difference in the volume of patients between these two groups which were 753 in 2001, 1,069 in 2001 (for private patients) compared to 835 in 2001 and 1,075 in 2004 (for general patients) (Table 1).

Table 1

A comparison of Caesarean section rates among the private and general patients at the Aga Khan University Hospital for 2001 and 2004

		Overall figures	Private patients	General patients	P-value (95% CI)
2001	No. of Deliveries	1,588	753	835	<0.001
	No. of C/section	412	232	180	(16.97-35.23)
	C/section rate	25.9%	30.8%	21.5%	
2004	No. of Deliveries	2,142	1,069	1,075	0.001
	No. of C/section	817	446	371	(31.02-45.18)
	C/section rate	38.1%	41.7%	34.5%	
P-value (95% CI)		<0.001 (28.16-35.84)	<0.001 (25.53-46.97)	<0.001 (15.22-40.78)	

The rate of Caesarean section has constantly been higher in private hospitals compared to public hospitals as shown in Table 2.

Table 2

A comparison of Caesarean section rates in some of the public and private hospitals in Kenya, 1996

Hospital	Number of Deliveries	Caesarean section	Caesarean section rate (%)
Nairobi Hospital*	1055	347	33
Kenyatta National Hospital	5892	1763	30
Aga Khan Hospital, Nairobi*	2125	432	20.4
Embu Provincial Hospital	1310	177	13.5
Pumwani Maternity Hospital	22922	1715	8
Thika District Hospital	7655	603	7.8
Machakos General Hospital	1298	177	7.3
Coast Provincial General Hospital	9234	486	5.3
Kakamega Provincial Hospital	3798	179	4.7
Kwale District Hospital	1398	38	2.7

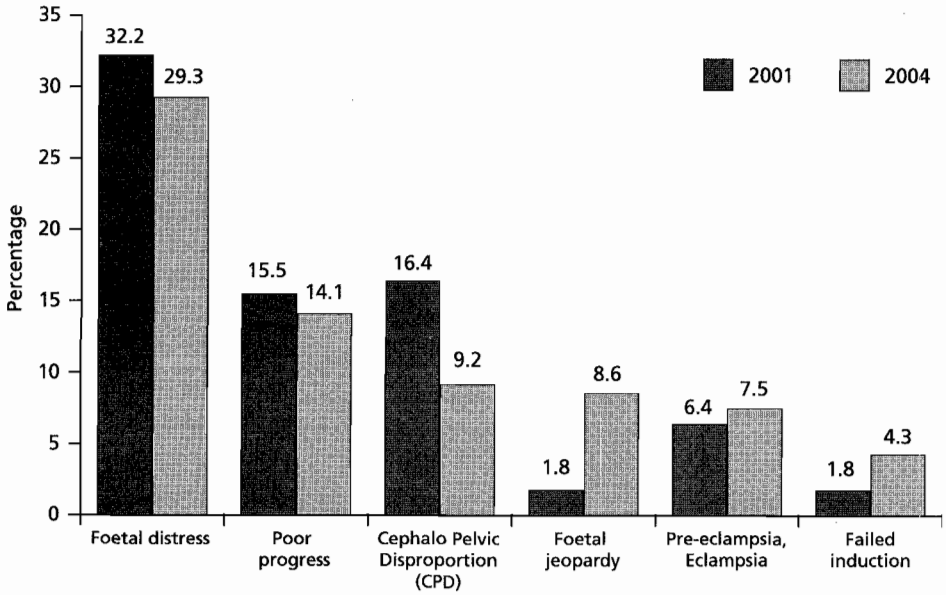
* Private Hospitals

Source. Gichangi P. *et al*, (27)

The main indication for emergency Caesarian section remains foetal distress over the years. There was however, a higher rate of foetal distress in 2001 (32.2%) compared to 29.3% in 2004 (p=0.004 95%CI 27.9-33.6). Other indications for emergency Caesarian section are poor progress labour and foetal jeopardy as diagnosed by decreased umbilical and middle cerebral artery doppler flows and cardiotocography.

Figure 1

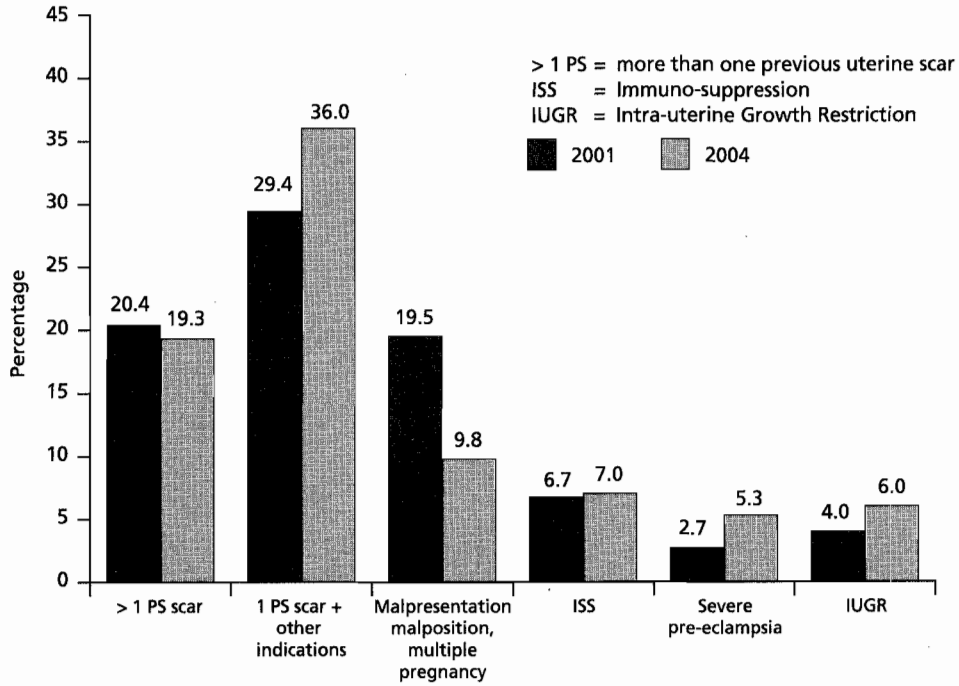
The main indications for emergency Caesarian section at the Aga Khan University Hospital



The main indications for elective Caesarean section are shown in Figure 2. Other indications included malpresentation (persistent breech presentation, oblique lie, transverse lie), intra-uterine growth restriction, pre-eclampsia, bad obstetric history, prevention of mother to child transmission of HIV and mother's own choice. There was a non significance change in mothers electively choosing to deliver by Caesarian section without any obstetric indication (0.86% in 2001 compared 1.43% in 2004) p=0.95, 95%CI 0.59-1.71.

Figure 2

The main indications for elective Caesarean section at the Aga Khan University Hospital



Of the total births over the study period, 165 (10.4%) were ≤2.5kgs in 2001 while in 2004 these were 228(10.6%). Overall there were 20 early neonatal deaths in 2001 and 23 in 2004. This translates to an early neonatal mortality rate of 12.8 per 1,000 live births in 2001 compared to 10.8 per 1,000 live births in 2004 (p=0.08, 95%CI 9.84-13.76). The perinatal mortality rate was 25.2per 1,000 births in 2001 and 14.0 per 1,000 births in 2004 (p<0.001, 95%CI 8.58-30.62).

Table 3

The early neonatal mortality rate and perinatal mortality rate for babies weighing ≥2500gms

	2001	2004	P-value, (95%CI)
Total births	1,588	2,142	-
Infants ≥ 2500 gms	1,423	1,914	-
% Low birth weight	10.4%	10.6%	0.4 (10.30-0.70)
Perinatal mortality rate	20 (25.2/1,000)	30 (14.0/1000)	<0.001 (8.58-30.62)
Early neonatal mortality rate	20 (12.8/1000)	23 (10.8/1000)	0.08 (9.84-13.76)

Table 4

The underlying causes of the neonatal deaths

Cause	2001		2004		P-value, (95% CI)
	No.	(%)	No.	(%)	
Respiratory distress syndrome	13	65	11	47.8	<0.001 (39.95-73.35)
Congenital anomalies	2	10	5	21.7	<0.001 (4.34-27.36)
Intraventricular haemorrhage	1	5	-	-	-
Birth asphyxia	3	15	3	13.0	0.08 (12.04-15.96)
Meconium aspiration	-	-	3	13.0	-
Viral infections	1	5	-	-	-

DISCUSSION

There has been a lot of debate on the appropriateness of the steadily rising Caesarian rates worldwide, with many people arguing whether there is any justification to this increase. Some countries such as the USA and Canada have recognised this as a major public health problem and instituted measures to reduce the rates (17).Whether the recent decline in infant mortality is due to the increase in Caesarian section rate is still not clear as many European countries like Sweden, Belgium and Ireland have very low Caesarian rates (5-12%); yet have much better maternal and neonatal outcomes than Chile and Brazil which have high rates of 40% and 37% respectively (3,4). Unnecessary Caesarian sections do more harm than good. When all is normal with the mother, Caesarian section has an eightfold higher mortality than vaginal delivery (18), 8-12 times higher morbidity (19) and a higher incidence of

complications in subsequent pregnancies. Caesarian section results in a higher risk of respiratory distress and prematurity(20).

Kaihura *et al* (9) found a perinatal case fatality rate associated with a Caesarean section rate of 10.3% at 36.6/1000, a maternal case morbidity rate at 20.6% and maternal case fatality rate at 6.1/1000 in a local general hospital (9). However, correlated to similar studies at Pumwani, Mombasa, Kericho and Mwanza, the Caesarean section-related case fatality rate and maternal morbidity rate did not change significantly with higher Caesarian section rates (10-13).

In the WHO consensus conference in Brazil in 1986 (2), it was concluded that there is no justification for any region to have a Caesarian section rate higher than 10-15%, for attaining the best maternal and foetal outcome. Overall there has been a steady increase in Caesarian section rates in different regions; 32.6% (population-based) in Madras-India (21). In England this has risen from 9% to 18.8% in 1997-1998 and 21.3% in 2000(15, 22). The global Caesarian section rate has constantly been higher in private institutions compared to public hospitals, with some private hospitals in Brazil having rates as high as 70% (23-26). The trend is similar in Kenya with the rate in one private hospital having increased from 26% to 32.9% in a period of one year (27, 28).

In this study the overall Caesarian section rate at the Aga Khan University Hospital, Nairobi has significantly risen by 12.2% over the past four years and now compares with the highest hospital based Caesarian rate in the world and locally (37% and 40%) (3, 28). Contrary to the debate alluded to above there has equally been a major improvement in the perinatal outcome with the perinatal mortality rate dropping by 11 per 1,000 live births and the early neonatal mortality rate dropping by 2 per 1,000 live births over the same period. A similar association was observed in three hospitals in Dublin. Matthews *et al* (29) observed a remarkable consistent association between an increasing C-section rate and a falling mortality rate for three hospitals in Dublin. In their study it was noted that the hospital with the highest Caesarian section rate consistently had the lowest perinatal mortality rate for a cumulative period of 22 years. Similarly Patel SR and Katiti C (30) found the Apgar scores of babies diagnosed with foetal distress and delivered by Caesarian section to be better than those delivered vaginally (30). According to Gichangi *et al* (27) the low national rate of Caesarean section was found to be a major concern in Kenya with some regions with very low rates of 2.7% recording very high maternal mortality rates of up to 1,216 per 100,000 deliveries while those with high rates like Nairobi Hospital recording negligible mortality rates. However, the main reason for low Caesarean section rates was found to be mainly that of lack of availability and accessibility to these facilities (27).

Many changes that have occurred over the years including electronic foetal monitoring devices, ultrasonography with doppler flow studies, cord tracing in routine obstetric scan and neonatal intensive care unit services. These advanced diagnostic and therapeutic facilities available at the Aga Khan University hospital assist in early detection of foetal compromise and subsequent intervention. As a result foetal distress remains the main indication for emergency Caesarean section. This compares with results from other advanced centres as opposed to resource-limited noted that most of the elective Caesarian section were in mothers with a previous Caesarian delivery (49.8% in 2001 and 55.3% in 2004). These are high risk mothers and prompt intervention is usually needed to avoid any morbidity and mortality. With the recent rise in the prevalence of HIV positive mothers (11-17% in urban areas) (31) many are opting for Caesarian section to prevent transmission of the virus to the baby.

It is worth mentioning that despite the perinatal and early neonatal deaths being low this could mask the benefit from Caesarian section, as the main contributors to this are lethal anomalies, and extremes of prematurity which are not amenable to obstetric intervention and are unlikely to be affected by Caesarian section. Birth weight-specific mortality, in normally formed infants, is widely accepted as a sensitive marker of the quality of obstetric care (32). This study shows a very low mortality rate in infants weighing more than 2500gms (4.22/1,000 in 2001 and 3.6/1,000). There is therefore evidence that the overall obstetric care in our hospital has improved. However there is still need to correlate the neonatal outcome with the indication for the Caesarian delivery.

Murphy (33) suggested that a bench marking process comparing outcomes from different consultant staffed units in the UK with different Caesarian section rates could be useful. A similar

process was undertaken at a private hospital in Nairobi comparing the Caesarean section and induction rates among different consultants in the unit (28). This could be very helpful in identifying any unnecessary interventions being taken for other purposes other than the mother's well being.

There has been a significant increase in Caesarian section rate over the years. As much as the rising trend is worrying and calls for urgent regular audit and intervention, the perinatal outcome has improved remarkably over the same period. The reasons for the improved outcome are multifactorial. It could be due to early detection of foetal compromise, improved diagnostic facilities and better neonatal care leading to good perinatal outcome. There was no indication in our study that the improved perinatal outcome was due to increased Caesarean section rate as there are many variables that need to be controlled for. More hospitals within the region should regularly audit their Caesarian section rates and publish similar matching Caesarian section and mortality rates to be able to know whether these results are consistent with other centres. Studies are also needed specifically to correlate the Caesarean section rate to the perinatal outcome. Only then can conclusive evidence be available as to whether there is any cause for concern for the rising Caesarian section rates. This study should be able to renew the debate on this very sensitive subject among health care providers in the region.

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