

FETAL AND MATERNAL COMPLICATIONS OF FORCEPS AND
VACUUM EXTRACTION AT THE
UNIVERSITY TEACHING HOSPITAL
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BY

CHIPILI KAOMA
BSc, HB MBChB (UNZA)

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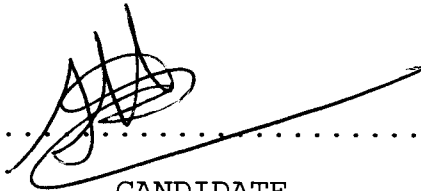
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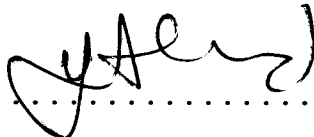
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SUPERVISING LECTURER

APPROVAL

This dissertatuion of **Dr. Chipili Kaoma** is approved as fulfilling part of the requirements for the award of the degree of Master of Medicine (Obstetrics and Gynaecology) by the University of Zambia.

Signature

Date

V. M. M. de Silva

..27.08.1993

David R. Cleary

7.8.93

[Signature]

7.8.93

[Signature]

7.8.93

ABSTRACT

The study was conducted at the University Teaching Hospital Department of Obstetrics and Gynaecology. The aim of the study was to find out Fetal and Maternal complications of Forceps and Vacuum extractions deliveries.

The literature reviewed is related to Fetal and Maternal complications of Forceps and vacuum extraction deliveries.

This was a retrospective study which looked at three hundred (300) forceps deliveries and three hundred (300) vacuum extraction deliveries. Information was obtained from files and delivery register kept in Labour ward. No attempt was made to compare the complications of the two instruments.

The findings of the study showed that both instruments have complications related to their use. In the forceps group maternal morbidity of cervical and vaginal lacerations, and bleeding (>500 ml) were more frequently noted whilst neonatal morbidity of cephalhaematoma scalp lacerations and neonatal jaundice were highest. Similar observations were noted in the vacuum group. A prospective study comparing the complications of the two instruments is needed.

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Lastly but not the least, I thank all those who helped me in one way or another during this period.

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DEDICATION

DEDICATED TO MY CHILD CHIPILI.

STATEMENT

I HEREBY CERTIFY THAT THE WORK PRESENTED IN THIS DISSERTATION IS ENTIRELY A RESULT OF MY OWN INDEPENDENT WORK. THE VARIOUS SOURCES TO WHICH I AM INDEBTED ARE ACKNOWLEDGED IN THE TEXT AND IN THE BIBLIOGRAPHY.

SIGNED.....

CANDIDATE

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CHAPTER 1INTRODUCTION AND OPERATIONAL DEFINITIONS1. Introduction

The aim of this retrospective study was to find out the effect of forceps and vacuum extraction deliveries on the Mother and the Newborn. The study looked at forceps and vacuum deliveries that were performed at the Department of Obstetrics and Gynaecology of the University Teaching Hospital (UTH) between 1988-1992 that occurred in the Labour ward.

In UTH as in several other countries, vacuum extractions has virtually replaced low forceps. Forceps were considered traumatic and dangerous for both the infant and the mother.

In our Hospital the use of both Wrigley's forceps and vacuum delivery is still practised but the effects of such instrumental deliveries on the mother and newborn were not known. This study therefore provides relevant information on the morbidity associated with low forceps and vacuum deliveries.

At present the policy on instrumental delivery is a matter of decision left to the attending Consultant and Registrar on call to make. There are situations whereby the doctor in training decides to use forceps and when this fails attempts vacuum delivery, this misuse of both forceps and vacuum can be traumatic to mother and the baby.

2. Operational Definitions

The definitions that follow are intended solely for use in this study and are not necessarily valid for other purposes:

Arrest, Deep Transverse: is the cessation of Labour with the presenting part of the fetal head in the transverse position (occiput left transverse or occiput right transverse) 1 cm or more below the Ischial spines.

Apgar Score: is a system of numerical evaluation that describes the status of the infant at one minute and five minutes after birth. A score of zero indicates a severely jeopardized infant; the higher the score, up to a maximum of 10, the better the condition of the infant.

Cephalhematoma: is a collection of blood underneath the periosteum of the fetal skull.

Forceps Operation: is the application of obstetric forceps to the fetal skull when the scalp is or has been visible at the introitus without separating the Labia and Sagittal suture is in the anteroposterior diameter of the outlet of the Pelvis.

Obstetric Laceration: An obstetric laceration is a tearing of the vulva, vaginal and occasionally the rectal tissues.

Position: is the relationship of designated point on the presenting part of the fetus to a designated point in the maternal pelvis.

Occiput Anterior: is the position of the fetus in which the occiput is located directly anterior.

Occiput Posterior: is the position of the fetus in which the occiput is located directly posterior in the hollow of the sacrum.

Station: is the location of the presenting part in the birth canal relative to the ischial spines.

Station 0 is attained when the presenting part has reached the level of the ischial spines.

Station +1 is attained when the presenting part is 1cm below the biischial spines.

Station +2 is attained when the presenting part is 2cm below the biischial spines.

Station +3 is attained when the presenting part is on the perineum.

Station +4 is attained when the presenting part is about to crown.

Vacuum Extraction Operation: A vacuum extraction operation is an operation for the extraction of the fetal head from the mother by use of a vacuum extractor applied to the fetal scalp and are classified in relation to the location or station of the fetal skull.

CHAPTER 2LITERATURE REVIEW

Studies comparing forceps and vacuum extraction usually show that vacuum extraction is more advantageous for both infant and mother (1,2). The indications for the procedures have been different and fetal distress has tended to be the more common indication in the forceps group (3,4).

Retrospective studies have shown the distinct advantage of vacuum extraction and the reduced need for anaesthesia (2,5).

Low forceps delivery have been usually considered safe for the infant(6). However, increased perinatal mortality has been reported after low forceps delivery when protracted labour was the indication (7). Other studies compared different methods of instrumental delivery by the electronic measurement of compression and traction during delivery (8)

with the exception of vacuum extraction, the overall duration of compression of the fetal head was less marked for instrumental than for normal delivery, due to the shorter delivery times.

Retinal haemorrhage was shown to be five times more common after vacuum extraction than either forceps or spontaneous delivery (9). A review article (10) showed that a scalp abrasion or laceration occurred in 13%, Cephalhematoma in 6% and intracranial haemorrhage in 0.35% of the infants born by vacuum extraction. Classic cephalhematoma can accumulate beneath the periosteum of a single cranial bone because of the rupture of a diploic or emissary vein. These lesions often resolved slowly over a period of many weeks. A much more serious injury to the newborn than any scalp injury is intracranial haemorrhage (3). Detachment of the vacuum cap on several occasions can cause cranial fractures.

In a recent study (3), a significantly higher maternal morbidity, such as lacerations and secondary anaemia, was found after forceps delivery than after vacuum extraction. The occurrence of third and fourth degree tears and cervical lacerations was 48% in the forceps group and 18% in the vacuum extraction group.

lacerations was 48% in the forceps group and 18% in the vacuum extraction group.

Therefore from the literature review it can be seen that both instruments can cause trauma to mother and fetus. Furthermore it should be noted that indications for the two instruments vary and may differ substantially with protocols and experience of users.

CHAPTER 3PROJECT JUSTIFICATION

Doctors in training experience problems in complying with the standard procedures and prerequisites that have to be observed before the use of forceps and vacuum extractor. Observation and experience have shown that the major factor constraining compliance is lack of, or limited knowledge, doctors possess on complications of forceps and vacuum deliveries. Doctors in training are generally more comfortable using a vacuum extractor than forceps. This statement is supported by a study (5) which looked at the deliveries performed by a specialist and by a doctor in training.

In a situation whereby the doctor in training decides to use forceps and when this fails, attempts at vacuum can be traumatic to the baby. Limited knowledge or lack of it results in poor assessment of the presentation, engagement, station and position of the fetal head at the start of extraction and this can result in failed forceps or vacuum extraction delivery.

Both the mother and the baby suffer the effects of complications of misuse of forceps and vacuum extractor.

The hypothesis:

Thus, the study seeks to answer the research question: "what are the Fetal and maternal complications of forceps and vacuum extraction at UTH?"

It is hoped that the findings will lead to increased awareness of the hazards of forceps and vacuum extraction deliveries (some remediable) and also reduces the cost on the hospital arising from treatment of the complications.

CHAPTER 4METHODOLOGY1. Research Design

The purpose of the study was to find out the fetal and maternal complications of forceps and vacuum extraction deliveries.

2. Inclusion Criteria

- i. Forceps and vacuum deliveries performed at the department of obstetrics and gynaecology of the University Teaching Hospital in the five (5) years 1988-1992.
- ii. Patients delivered by Malmstrom vacuum extractor and Wrigley's forceps only.
- iii. As there are roughly 1 forceps for every 5 ventouse, every 5th ventouse was selected during the study period.
- iv. Corresponding neonates delivered by vacuum and forceps.
- v. The sample consisted of the first three hundred (300) forceps and three hundred (300) vacuum extraction deliveries performed between 1988-1992 as described above.

4. Research Setting

The study was conducted at the University Teaching Hospital (UTH) Department of Obstetrics and Gynaecology. The UTH is the Largest health institution in the country. It has a bed capacity of one thousand five hundred (1,500). It serves as a referral centre for patients from all over the country and as a teaching centre for various health professions.

UTH Labour ward conducts about fifteen thousand (15,000) deliveries per year. It is run in four (4) firms; each firm is headed by a different consultant. Deliveries are conducted every day with an in-charge registrar on twenty-four (24) hour call and a number of senior house residents, and junior residents.

5. The sample: Selection and recruitment

Information was obtained from files of forceps and vacuum deliveries. Maternal case records were retrived from the file record room at the Department of Obstetrics and Gynaecology of UTH. Neonatal case records were obtained from the file record room at the department of Neonatology of UTH.

6. Data Management

- i. All records entered into files, partograms and decision made on mode of delivery and intervention thereof were noted.

Malmstrom vacuum extractor and Wrigley's Low forceps available in our department were exclusively considered. There are very few other type of forceps used.

- ii. Records of forceps and vacuum deliveries performed by specialists and by doctors in training were sought.
- iii. Presentation, position and the station of the fetal head at the start of the delivery was noted.
- iv. Maternal morbidity was analysed in terms of vaginal and cervical lacerations, amount of bleeding, fever (at least 2 days $> 39^{\circ}\text{C}$), duration of hospital stay.
- v. Neonatal morbidity was assessed in terms of Apgar scores, cephalhaematoma and scalp lesions, jaundice, and other evidence of trauma, including intracranial haemorrhage, signs of cerebral irritation and mortality.

vi. Factors such as duration of labour, fetal distress, parity, gestation age and use of syntocinon were noted.

7. Data Analysis

Data were first categorized, then counted and tallied. The counts were summarised using frequencies and percentages. Tables were used so that the statistical data can be put together as a basis for computation.

8. Ethical consideration

There were no ethical consideration in this retrospective study. However permission was obtained from the Ethical Committee and Hospital Administration to conduct the study.

CHAPTER 5PRESENTATION OF FINDINGS

In order that the collected data may be readily understood, all information of findings pertaining to a particular aspect of the study are presented together.

The findings of the study have been presented in table form. It aided in summarizing a whole body of information collected and assisted in looking at the relationships between variables. Below are the findings and percentages in the tables have been rounded to whole numbers.

Table 1 and 2 depicts data about presentation and station of the fetal head at the start of extraction.

Maternal and neonatal morbidity in forceps and vacuum extraction deliveries is reflected in tables 3 and 4.

The information given in tables 5 and 6 shows infant birthweights and Apgar scores in forceps and vacuum extraction deliveries.

Table 7 and 8 indicates operators experiences in forceps and vacuum extraction deliveries.

Gestation at time of delivery is shown in Table 9 and 10.

Table 11 and 12 brings out indications for forceps and vacuum extraction deliveries.

Since this was not a formal case-control study, no attempts have been made to compare the results statistically.

Table 1: PRESENTATION AND STATION OF THE FETAL HEAD AT THE
START OF FORCEPS EXTRACTION

Characteristics	Forceps delivery (n=300)	Percentage
Presentation		
Occiput Anterior	260	87
Occiput posterior	40	13
Deep transverse arrest	0	
Station		
< 0	8	3
+1, +2	21	7
+3, +4	271	90

Table 2: PRESENTATION AND STATION OF THE FETAL HEAD AT
THE START OF VACUUM EXTRACTION

Characteristics	Vacuum delivery (n=300)	%
Presentation		
Occipito Anterior	244	81.3
Occipito posterior	56	18.7
Deep transverse arrest	0	0
Station		
< 0	21	7
+1, +2	26	8.7
+3, +4	253	84.3

Table 3: MATERNAL AND NEONATAL MORBIDITY IN FORCEPS
DELIVERIES

Morbidity	Forceps delivery (n=300)	%
Maternal		
Cervical and Vaginal Lacerations	89	30
Bleeding (>500ml)	17	6
Fever (>38 C)	7	2
Hospital stay (> 8 days)	31	10
Neonatal		
Cephalhaematoma scalp lesion	52	17
Neonatal jaundice	61	20
Fractured clavicle	0	0
Signs of cerebral irritation	0	0
Erb's palsy	0	0
Anaemia	3	1
Cranial fracture	0	0
Neonatal death	12	4

Table 4: MATERNAL AND NEONATAL MORBIDITY IN VACUUM
EXTRACTION

Morbidity	Vacuum delivery (n=300)	%
Maternal		
Cervical and Vaginal Lacerations	98	33
Bleeding (>500ml)	26	8.7
Fever (> 38 C)	18	6
Hospital stay (>8 days)	42	14
Neonatal		
Cephalhaematoma scalp lesion	112	37.3
Neonatal jaundice	86	28.7
Fractured clavicle	4	1.3
Signs of cerebral irritation	0	
Erb's palsy	6	2
Anaemia	6	2
Cranial fracture	0	
Neonatal death	39	13

Table 5: INFANT BIRTHWEIGHTS AND APGAR SCORES IN FORCEPS DELIVERIES

	Forceps delivery (n=300)	%
Birthweight (g)		
<2500	24	8
2501-3000	30	10
3001-3500	81	27
3501-4000	103	34
>4000	62	21
Apgar Scores		
At 1 min		
0 - 3	5	2
4 - 6	32	10.7
7 - 10	263	87.7
At 5 min		
0 - 3	6	2
4 - 6	15	5
7 - 10	279	93

Table 6: INFANT BIRTHWEIGHTS AND APGAR SCORES IN
VACUUM EXTRACTION DELIVERIES

	Vacuum delivery (n=300)	%
Birthweight (g)		
<2500	12	4
2501-3000	17	5.7
3001-3500	72	24
3501-4000	144	48
>4000	55	18.3
Apgar Scores		
At 1 min		
0 - 3	23	7.7
4 - 6	46	15.3
7 - 10	231	77
At 5 min		
0 - 3	14	4.7
4 - 6	24	8
7 - 10	262	87.3

Table 7. OPERATORS EXPERIENCE IN FORCEPS
DELIVERIES

Operator	Forceps delivery (n=300)	%
Consultant	32	10.7
Registrar	136	45.3
Senior House Resident	82	27.3
Junior House Resident	0	0

Table 8: OPERATORS EXPERIENCE IN VACUUM
EXTRACTION DELIVERIES

Operator	Vacuum Extraction (n=300)	%
Consultant	20	6.7
Registrar	189	63
Senior House Resident	89	29.7
Junior House Resident	2	0.7

Table 9 GESTATION AT TIME OF DELIVERY

Gestation (Weeks)	Forceps delivery (n=300)	%
<36	26	8.7
37 - 41	261	87
> 42	13	4.3

Table 10: GESTATION AT TIME OF DELIVERY

Gestation (Weeks)	Vacuum Extraction	
	(n=300)	%
<36	72	24
37 - 41	207	69
> 42	21	7

Table 11 INDICATION FOR FORCEPS DELIVERY

Indication	Forceps delivery (n=300)	%
Fetal distress	49	16.3
Protracted labour	190	63.3
Pre-eclampsia and eclampsia	32	10.7
Others	19	6.3

Table 12: INDICATION FOR VACUUM EXTRACTION
DELIVERY

Indication	Vacuum delivery (n=300)	%
Fetal distress	52	17.3
Protracted labour	182	60.7
Pre-eclampsia and eclampsia	49	16.3
Others	17	5.7

CHAPTER 6DISCUSSION OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS1. Discussion of findings:

The study aimed at establishing the Fetal and maternal complications of forceps and vacuum extraction deliveries.

Vacuum

In 300 deliveries by vacuum extractor 39 babies (13%) died (Table 4). No postmortem was done due to lack of manpower to carry out postmortem operations which are only performed when a special request is made by relatives or the police. The high mortality and morbidity is related to a number of factors such as poor patient selection and assessment at start of the operation, lack of adequate resuscitation facilities, fewer senior staff and general lack of manpower at each level.

The commonest Neonatal complication was jaundice (Table 3) in 112 (37.3%) deliveries by the vacuum extractor. In 182 (60%) of vacuum extraction, intervention was decided upon because of lack of progress in Labour (Table 12) from secondary uterine inertia or maternal exhaustion. Fetal distress was an indication in 52 (17%) deliveries by the vacuum extractor (Table 12).

The "Chignon" of the child's scalp disappeared in most instance within 24 hours except in 112 (37%) cases with cephalhaematoma (Table 4). This high percentage of scalp lesions may suggest that the technique is faulty or that the vacuum extractor is faulty. Our vacuum extractors occasionally are not working properly (leaking system and faulty pressure gauge) or one is forced to use a faulty machine because there is no other alternative.

In 56 (18%) cases of vacuum extraction (Table 2) there was persistent occipitoposterior position of the head.

In 49 cases (16%) of vacuum extraction there was a clear cut reason to prevent undue maternal exertion such as pre-eclampsia and eclampsia (Table 12). It is policy in our department to do assisted vacuum delivery in all such cases. In the vacuum extraction group the main complications were cervical and vaginal lacerations (Table 4) with 90 cases (30%), Bleeding was severe in 26 cases (8%) and hospital stay of more than 8 days (Table 4) was in 42 cases (14%).

Forceps

Out of 300 deliveries by forceps, protracted Labour (Table 11) was the principal indication in 190 (63%).

In 52 (17%) cases of forceps deliveries the neonate developed cephalhaematoma (Table 3) and scalp lesions.

Neonatal jaundice was in 61 (20%) and Neonatal death (Table 3) in 12 (4%). Fetal distress was in 49 (18.3%).

It should be pointed out that the obstetrics practiced in our department is conservative, based on natural childbirth with liberal use of analgesia. In 84 (18%) cases of forceps delivery the main complication was cervical and vaginal lacerations (table 3) and 5 cases (2%) there was severe birth canal trauma. Hospital stay (table 3) of more than 8 days was in 31 maternal cases (10%).

This high morbidity suggest that there is need for knowing the proper technique of using Wrigley's forceps.

In this study the morbidity and mortality was high due to lack of continous fetal monitoring by electrocardiograph. In UTH we monitor the fetal heart by a Pinard scope. In addition our Institutional Caesarean Section rate is 10 percent (3-4% in Lusaka). This should probably be much higher. Probably many of the instrument deliveries should be better delivered by Caesarean Section.

2. Conclusions:

- i. Instrumental deliveries have distinct complications as observed from the findings in the results.
- ii. The more senior in training an operator is the less the occurrence of complications on both mother and neonate.
- iii. Careful post-delivery follow up and clinical evaluation identifies complications early and may be cost-effective.
- iv. Adequate patient assessment and proper choice of instrument to be used pre-operative can substantially reduce maternal mortality and morbidity.

3. Recommendations:

- i. To reduce morbidity and mortality.
Junior residents need to be assisted during forceps and vacuum deliveries.
- ii. Standardised form on forceps and vacuum deliveries.
Need to have a standard form (Appendix 1) for instrumental delivery.
- iii. Future studies on instrumental deliveries.
A comparative prospective case-control study is needed.

iv. Neonatal intensive care unit.

Introduction of rapid movement of birth asphyxiated babies to the neonatal intensive care unit.

v. Faulty vacuum extractors.

Introduction of automatic vacuum extractor instead of hand-pump type.

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APPENDIX 1A RECORD OF FORCEPS AND VACUUM EXTRACTION

NAME:.....HOSPITAL NO:.....

DATE:.....TIME:.....

INDICATION

PARITY,

- SECOND STAGE DELAY

- FETAL DISTRESS

- OTHER

CERVICAL DILATATION

POSITION

HEAD STATION

DURATION

CONTRACTIONS PER 10 MINUTES

HEAD DESCENT WITH

CONTRACTIONS YES/NO

SYNTOCINON YES/NO

NUMBER OF PULLS:

SIZE OF CUP

DELIVERY COMPLETED BY VACUUM

SEX:

YES/NO

OTHER - WHICH METHOD?

BIRTH WEIGHT:

APGAR SCORE - 1 MINUTE,

5 MINUTES

OPERATOR

SUPERVISOR

CONSULTED WITH.