Forceps delivery in 21st century obstetrics

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Abstract

Forceps delivery is an evidence-based alternative to caesarean section when vaginal delivery proves difficult or impossible in second stage of labour. In current practice not every trainee has the opportunity to learn on a model first and models lack realism. This paper highlights the possibility for training of all junior obstetricians on a simulator which provides a platform for training of forceps placement and traction. This should be a part of clinical skill drill in every labour ward. New training models will help us in the assessment of traction force and of any mechanical effects these actions have on the fetus, the fetal head and skull in particular.

INTRODUCTION

In recent years the Cesarean Section (CS) rate has risen and there has been a gradual decline in instrumental delivery. This trend is seen in many countries, possibly due to concerns over neonatal and maternal safety, medico-legal issues as well as fewer clinicians skilled in forceps use [1]. This may reflect a perception of the practitioner that caesarean section has less morbidity. However this has not been supported by evidence [2]. Unfortunately, caesarean delivery as an alternative to instrumental delivery for fetal distress or dystocia in the second stage is not without serious complications either. Emergency caesarean section at full dilatation has very different implications from elective caesarean section in terms of morbidity and complication risks to the mother and the baby [3]. Instrumental delivery (obstetric forceps or ventouse) could potentially reduce not only the risks associated with caesarean delivery but reduce the costs of obstetric care [4]. The use of instrumental delivery is often a better alternative than emergency caesarean section when spontaneous vaginal delivery fails to progress in the second stage. The risk of severe obstetric morbidity quadruples with emergency CS as compared to vaginal delivery [5].

BACKGROUND

A case which has recently been has widely reported in the media, highlighted the need for experience in use of forceps delivery. The doctors are often accused of not making proper assessment or recording the level and position of the head before the application of the forceps blade. The action is always criticised of being inappropriate and irresponsible [6].

Obviously these statements highlight the need for an obstetrician to have the ability to apply obstetric forceps safely and effectively. This remains an important skill but a disappearing art. Correct positioning of the instrument is only possible if examination has been carried out properly and correctly before applying the forceps. This requires prior adequate training and experience. It has been said by Ian Donald that the “Trial of forceps is like lion taming; it is not the sort of exercise one would willingly undertake in the expectation of failure” [78].

APPROPRIATE METHOD OF APPLICATION OF FORCEPS BLADE

In the application of forceps in a direct occipito-anterior position (sagital suture is in the mid line and occiput facing towards the roof) the long axis of the blades should lie symmetrically between both sides of the head. The forceps should lock easily without any force and be the handles should lie parallel to the plane of the floor. Traction should be only applied during uterine contractions unless there is a need to deliver the baby in emergency (continuous traction may be necessary in the absence of contraction). The amount of traction should be the least necessary to accomplish safe delivery. In biomechanical studies, safe limits of 45 pounds in primigravida and 30 pounds in multigravida have been suggested [910]; however, if care is not taken, these limits can easily be exceeded by most clinicians [11].

It is important to know when to abandon the procedure

which is very much dependent on the operator's experience and expertise [12] . If there is no progress in 3 traction attempts, abdominal delivery should be contemplated. The use of a second instrument in a difficult situation is controversial as it is associated with an increase in morbidity and a senior obstetrician should be involved in the decision making [13] .

A number of studies indicate that vacuum assistance is more likely to fail than forceps [14] . The failure may be defined as inability to apply the intended instrument or deliver the baby, necessitating the use of another type of instrument, caesarean section, or both).

HOW TO APPLY FORCEPS BLADE CORRECTLY TO AVOID FAILURE AND INJURY?

The most crucial point of forceps delivery is precise knowledge of the position and the station of the fetal head. This must be assessed before application and adequate analgesia should be provided [15] . At the beginning of the application, the left blades should be held like a pencil in right hand, almost in a vertical position. As the blades are introduced into the vagina, they are brought to a horizontal position avoiding levering or forcing the blades to assemble. The left blade is left in place to stand freely or is held in place without pressure by an assistant. The right blade is introduced into the right side of the pelvis in the same fashion making sure blades lock without pressure. After application of both blades the shanks should lie almost parallel to the floor. Application should be done in between the contraction (blades may be left in place if a contraction ensues during the procedure) [1316] .

USE OF MODERN TECHNOLOGY IN TRAINING

Simulators and mannequins are used to teach a variety of practical skills to achieve a degree of experience and confidence before embarking on real cases. Scenario training may be useful in different stages of training for all grades of medical practitioners. An increasing number of courses aim to teach the skill of instrumental delivery e.g. ALSO and MOET. Motor learning tasks using visual feedback can be used in training practitioners to produce appropriate traction forces during forceps deliveries.

A study carried out in USA tested the maximum traction force applied to forceps during simulations by male and female residents, in standing and sitting positions. This suggested that men can generate traction forces exceeding the recommended limit [19] . In general, both sexes generated more traction in the sitting position than in the standing position. The mean maximum traction produced by men in the standing and sitting positions was 69.5 and 85.8 pounds, respectively. For women, the mean maximum force generated was 45.5 pounds in the standing position and 61.3 pounds in the sitting position. The study suggested the need for training on a simulator to allow the practitioner to know how to achieve or reproduce an appropriate force (an optimal force range of 30-45 pounds). This can be done in the short term after training by computer-assisted visual feedback [12] .

Currently available training mannequins for obstetric forceps delivery may lack realism and there is no facility to measure the traction force. A feasible alternative to the current training procedures is the use of either virtual or augmented reality technology in combination with tactile feedback and realistic training in a virtual environment [20] . This may be the way forward if instrumental delivery is going to remain a part of obstetric management in the 21 st century labour ward.

HOW TO ENSURE OPTIMAL FORCE DURING INSTRUMENTAL DELIVERY?

Since the introduction of forceps delivery in the 1600's, remarkable evolution of this instrument has occurred and almost 750 types of modifications are available. However, little progress has been made in devising instruments which can control and avoid excessive traction forces, in order to prevent injury to the fetal head. It is difficult to judge the adequate traction force during a time of crisis which very much depends on the individual clinician and their courage. Consequently, there is always the risk of a traction force being applied that exceeds the limits of safety, potentially leading to severe trauma to the fetal head, resulting in perinatal death, cerebral palsy, neurological disorders, mental retardation and behavioral problems in future). To avoid these dreadful complications, there has been a move over the recent years to develop a device which can measure the compression and traction forces applied to the fetal head.

A recent invention has used wireless technology and forceps with a strain gauge in the handle grip. The strain gauge measures the traction force between the grip assembly and the forceps shank (the typical range of force is 0 to 100 pounds during delivery). Feedback allows the clinician to accurately and safely gauge the amount of pull exerted. This may avoid excessive traction force minimising injury to the fetus and the mother [21]

CONCLUSION

Success of instrumental delivery is dependent on skill, adequate training and clear understanding of the fetal position and station. The operator must know of his or her own capabilities, the safe limits of the procedure, and must not exceed either of these. Where there is a doubt, a senior obstetrician must be consulted. The role of instrumental delivery should be emphasised more in reducing caesarean section rate in second stage of labour and minimising increasing morbidity in successive pregnancy which includes scar rupture, adherent placenta, and decreased fertility.

Instrumental delivery is appropriate and safe in skilled hand and should be considered instead of cesarean section in the second stage in most cases.

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