

## Intra and Post Circumcision Bleeding in Nigerian Neonates: Correlation with Hemostatic Parameters

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### Abstract

Circumcision is one of the oldest operations known. In Nigeria there is dearth of knowledge about the incidence of post-circumcision bleeding. Only one out of every seven males in the world is circumcised, however circumcision is the rule rather than the exception within all Nigerian ethnic groups and religions. This study investigated the relationship between some hemostatic parameters, family history and bleeding associated with circumcision of male infants in Ibadan, South West Nigeria.

**Materials and methods:** The study design involved a population of 244 male infants drawn from University College Hospital and Oluoyo Catholic Hospital, in Ibadan, Nigeria. Pre-circumcision PT and aPTT, factor VIIIc level, Platelet Count, incidence of Intra and post-operative bleeding were determined.

**Results:** None of the infants had a family history of bleeding disorder or thrombocytopenia. Six of the full term neonates (2.5%) had prolonged PT while only 2 of the subjects (0.8%) had prolonged aPTT. The factor VIIIc level was between 31-49% in 16.1%, while 1.6% of the neonates had levels between 20-26%. Intra-operatively, 28.9% (manual method, Gomco Clamp) and 4.9% (plastibell) had moderately severe bleeding while excessive post-circumcision bleeding was found in 2.8% and 6.8% for manual methods and plastibell respectively.

**Conclusion:** There was a positive correlation between pre-circumcision aPTT and the degree of post circumcision bleeding. A relationship would have been expected to exist between post-circumcision bleeding and factor VIIIc but this was not found to be significant in this study. Activated Partial Thromboplastin Time would probably be sufficient as a screening hemostatic test for the detection of neonates that may be at risk of bleeding post-operatively.

**Keywords:** Bleeding; Circumcision; Hemostatic parameters

### Abbreviations

aPTT: Activated Partial Thromboplastin Time; INR: International Normalized Ratio; PT: Prothrombin Time.

### Introduction

Circumcision remains the most common surgical procedure in the world including Nigeria and United States [1]. The existence of bleeding disorders and their familial occurrences has been noted in medical literature as early as the 16<sup>th</sup> century [2] and also in the Talmud writings. Despite the high circumcision rate of 87% [3] in Nigeria, there is little literature knowledge on the incidence and occurrence of post-circumcision bleeding. The circumcision rate in Nigeria is much higher than the world's average rate of 25-33% [4,5]. Hemorrhage has been known to be the most common complication related to circumcision in healthy male children with an incidence of 0.1-35% [6]. The human hemostatic system is dynamic and is influenced by the age of the individual. Plasma concentrations of proteins involved in hemostasis are significantly lower in the

newborns compared with levels in adults. Although hemostatic mechanisms are not fully optimal in the neonates, the healthy term neonates hardly bleed due to this. Hemostatic parameters such as PT and aPTT are dependent to a varying extent on both the gestational and post-natal age of the infant. In spite of the lower levels of coagulation factors, PT and aPTT are only slightly prolonged compared with normal adult levels; PT 14-16 sec, aPTT 45-50 sec [7] in healthy Nigerian neonates. Factors II, VII, IX and X that require vitamin K for final gamma glutamyl carboxylation step in their synthesis are reduced in the first 3-4 days after birth. Late hemorrhagic disease of the newborn or acquired prothrombin complex deficiency occurs 2-12 weeks after birth due to vitamin K deficiency [8]. The platelet count at term and pre-term infants are between 150 and 400 x 10<sup>9</sup>/L comparable to adult values [8].

It is customary in Africa, particularly in Nigeria, to circumcise all male infants after the 7<sup>th</sup> day of life [9]. Male circumcision is often performed in the South West of Nigeria as a routine, cutting across social, ethnic and religious barriers without prior coagulation screening tests. Babies are presented to the hospital in the morning of the surgery and are sent home within one hour post-surgery. This study was undertaken to determine the correlation between the intra

and post-circumcision bleeding and hemostatic parameter in neonates thus determining the appropriateness of laboratory investigation pre-circumcision to reduce incidence of post-procedural bleeding complications.

## Materials and Methods

This was a cross-sectional hospital based study. The study population was drawn from the University College Hospital (UCH) and Our Lady of Apostles (OLA) Hospital, both in Ibadan, Nigeria. The study proposal was approved by the UI/UCH institutional review board in Nigeria (IRC Protocol No-UI/IRC/04/0102). Informed consent was obtained from all mothers prior to collection of samples from their male infants.

A total of 3.8 ml of venous blood was collected from each male neonate immediately before circumcision from the superficial veins at the dorsum of the hand. 2 ml was dispersed into sodium Ethylene-Diamine Tetra Acetate (EDTA) specimen bottle for complete blood count and 1.8ml was added to 0.2 ml of 3.2M tri-sodium citrate for Factor VIIIc, PT and aPTT. Complete blood count was analyzed using the ADVIA 60 closed tube automated Hematology System (TA9-92161E00) manufactured by Bayer®. Factor VIIIc, PT and aPTT were processed using the manual standard procedures with commercial thromboplastin reagent (batch number 0001702088) and aPTT reagent (batch number 0015601078).

The method of circumcision used by the surgeon (UCH) Gomco clamp or the nurse (OLA) plastibell for each of the subjects were influenced by the method routinely employed by either institution at the time of the study. The techniques of Gomco clamp and plastibell use were followed strictly by the surgeon and the nurse performing the procedure. Anesthesia (dorsal penile nerve block or topical anesthetic cream) was not used on any of the infant while suture materials were provided in case of bleeding complication. Intra operative blood loss was assessed during surgery by the surgeon or the nurse performing the procedure using the weight of the blood soaked gauze (average sized plain gauze soaked with 5 ml of blood weighed approximately 5.3 kg). Post-operative bleeding was evaluated by the social worker during the home visits within the follow up period using the same method. A moderately severe bleed is blood loss greater than 10 ml of blood calculated from the weight/number of specific gauze used intra and post-operatively.

## Results

A total of 244 male infants less than 28 days of age were recruited for the study. None of the infants had a family history of bleeding disorders. All the neonates had hematocrit value ranging between 48 and 58 percent and platelet counts of 163-394 X 10<sup>9</sup>/l which were within the normal reference range. One hundred and ninety eight (81.1%) of the infants bled minimally (<10 ml), forty-five (18.4%) had intra-operative bleed >10 ml during the procedure. However, one (0.4%) of the infants (Gomco clamp method) bled severely (>30 ml) during the surgery warranting admission and observation for 24 hrs post-surgery. This infant had a normal INR and aPTT values.

The majority (97.5%) of the circumcised infants had a normal international normalized ratio (INR) ranging between 0.9-1.2. The remaining 2.5% accounting for 6 of the infants had a prolonged deranged INR (1.3-3.8). Out of the six neonates, who had deranged INR values, five bled minimally (<10 ml, adjudged to be normal) while only one had moderate bleeding intra-operatively (~10 ml).

Two (0.8%) of the infants had prolonged deranged aPTT values of 55 and 57 seconds. Both of them had normal intra operative bleeding while the neonate with aPTT value of 57 sec had moderately severe post-operative bleeding. A positive correlation was found between aPTT and post-operative bleeding,  $p=0.001$ . However, there was no significant correlation between PT/aPTT values and intra-operative bleeding  $p=0.534$ ;  $p=0.276$  respectively. Out of the subjects, 4(1.6%) had factor VIIIc level between 5-30% (Low), 39 (16.0%) had level between 31% and 50% (borderline) while 201 (82.4%) had level between 51 and 200%. Intra-operatively, 28.9% (manual method, Gomco Clamp) and 4.9% (plastibell) had moderately severe bleeding while excessive post-circumcision bleeding was found in 2.8% and 6.8% for manual methods and plastibell respectively.

## Discussion

This study was carried out in Ibadan, South West Nigeria including 244 male infants pre-circumcision and followed up post operatively showed a statistically significant positive correlation between the pre-circumcision aPTT and post-operative bleeding. Male circumcision has being a controversial subject in surgical practice. According to the American Academy of Pediatrics, the risks of newborn male circumcision are out-weighted by its preventive and public health benefits and that the procedure's benefits justify access to this procedure for families who choose it. The American College of Obstetricians and Gynecologists has endorsed this statement. Male circumcision has been noted to be an additional important strategy to prevent heterosexually acquired HIV infection in men which has been the driving force for adult male circumcision in many African countries with high prevalence of HIV infection [10,11]. In South West Nigeria, neonatal male circumcision is the norm, despite that, there is still insufficient data on the safety and incidence of the associated bleeding complications. In Bermuda, routine circumcision is rarely performed and most of the pediatricians still uphold the views of the Fetus and Newborn Committee of the Canadian Pediatric Society which states that circumcision of newborns should not be routinely performed. In a study conducted in South West Nigeria [3], high rate of complications from circumcision (20.2%) was documented including bleeding in one of their subjects. Complications resulting from the procedure in their study were also noted to be dependent on the personnel performing the procedure, majority of which are performed by the nurses in Nigeria. It is obvious in this study that the method of circumcision greatly influenced the severity of intraoperative bleeding. Approximately 30% of the subjects who had the procedure using the Gomco Clamp had moderately severe bleed compared with 5% who had plastibell method. The infant who had severe bleeding intra operatively had a normal INR and aPTT pre circumcision but most likely had the Gomco clamp removed prematurely necessitating quadrant sutures with fine stitches. Moderately severe post circumcision bleeding is a very serious complication in this part of the country because of poor access to health facilities during the event and limited resources to correct the associated hemostatic problems.

Emphasis is also being placed on the best time to perform the procedure. The neonatal period provides a window of opportunity for circumcision because the newborn has recently experienced the considerable trauma of birth; they heal quickly and are resilient. This author [9] believe that circumcision in the first 12 hours of life is more advantageous so the infant is not subjected to another round of trauma and fear after full recovery from the trauma of delivery. This approach

without the pre-circumcision screening with a test such as aPTT (perhaps using point of care testing) may not be without the risk of bleeding in some of these infants. Infants at risk for post-circumcision bleeding are those with bleeding disorders such as: von Willebrand's disease and hemophiliacs. The post-circumcision bleed may be the first indication of this disorder and a screening test such as aPTT would be of considerable importance.

## Conclusion

A pre-circumcision test such as aPTT is an important screening test for the risk of post-operative bleeding. Activated Partial Thromboplastin Time will probably be sufficient as a screening hemostatic test for the prediction of post circumcision bleeding in infants.

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