



# An Overview of Circumcision and a Modification that Prevents Glans Injuries and Cosmetic Problems in Patients with Circumcision made with the Guillotine Technique

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## ABSTRACT

**Aim:** Despite being an age-old practice, ongoing research and development are needed to improve the procedure to enhance its safety, efficacy and client satisfaction. The Guillotine technique, which is one of the most common methods, has been criticized for causing possible glans injuries and nonpleasing cosmetic results, especially when an inexperienced person tries it out. This research paper introduces the Modified Guillotine Technique (MGT), which was designed to address these issues.

**Materials and Methods:** This retrospective study involved analyzing 2853 miscarriages performed between 2006 and January 2022 using MGT on males aged between one month and fourteen years. The safety and efficiency of indirect wound healing through cosmetic outcomes and pain management *via* MGT were also examined.

**Results:** Compared with the traditional Guillotine technique, MGT was used in different age groups without any significant increase in operation time, thus indicating the continuation of treatment efficacy. It is important to note that there were no reports of gland injuries, while complication rates did not differ significantly from those obtained with other methods, thus emphasizing the safety and efficacy of MGT.

**Conclusion:** The Modified Guillotine Technique represents a major advance in circumcision practice by combining the effectiveness of the Guillotine method with an improved safety profile and cosmetic outcomes. By significantly reducing the risks associated with glomerular injury, but with the maintenance of procedural time and the addition of new complications, MGT offers a viable option for routine circumcisions worldwide.

**Key words:** Circumcision, Modified Guillotine Technique (MGT); Cosmetic outcomes; Glans injuries

**Abbreviations:** MGT: Modified Guillotine Technique; SPSS: Statistical Package for the Social Sciences; IRB: Institutional Review Board; VAS: Visual Analog Scale; SD: Standard Deviation; EVENDOL: A pain assessment scale for children under 7 years of age;  $\chi^2$ : Chi-square test; ANOVA: Analysis of Variance; HIV: Human Immunodeficiency Virus; HPV: Human Papillomavirus; SD: Standard Deviation

## INTRODUCTION

Circumcision is an ancient practice that humans have performed since the beginning of pregnancy and involves surgery in which foreskin is removed from the male penis. The main reasons behind this custom include religion, culture, and medicine [1]. Although it is an old method, both its technique and results are evolving, prompting continuous investigations to improve the procedure regarding patient content, safety and efficiency [2]. This study aimed to address the constraints associated with the Guillotine technique, which is one of the most widely implemented methods for circumcision, and to outline an alternative strategy to reduce the risks involved [3].

Although guillotine is widely used because it can be used for many

patients who are looking forward to undergoing circumcision procedures, it has also been criticized for its potential. These may involve injuries in the glans as well as poor cosmetic results, especially if performed by inexperienced surgeons [4]. The presence of these challenges requires the development of more advanced procedures that maintain the advantages of Guillotine while greatly reducing the risks linked to it [5]. By introducing the Modified Guillotine Technique (MGT), with the intention of preventing glans injuries and improving cosmetic outcomes, our research contributes to the overall goal of safer, faster circumcision with improved aesthetic appeal [6,7].

Our study fills a significant void in terms of the lack of standardized and simple low-risk approaches that could be adopted globally. This

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gap is especially important considering that circumcision is practiced worldwide and has health effects on men's lives. The invention of MGT and its use in a large cohort provide a unique opportunity to make progress in circumcision practice [8]. The aim of this research was not only to analyze glans injury prevention and complication rates but also to establish a new benchmark for safe circumcisions [9].

Furthermore, our study places itself ahead among other studies conducted in urology and pediatric surgery due to the operational time, recovery, and cosmetic improvement aspects of MGT [10]. Our comparison of MGT with standard circumcision techniques reveals not only the potential advantages but also important lessons into how to carry out this procedure effectively [11].

The goals of this study are to provide comprehensive insight into the historical and contemporary significance of circumcision; propose an innovative modification to the Guillotine technique, which is widely adopted; critically evaluate the safety, efficiency, and cosmetic aspects of such modified methods; and advocate for its adoption in regular circumcisions with the aim of reducing risks associated with traditional approaches. Hopefully, through this research, we will be able to improve surgical safety and patient satisfaction, which will ultimately influence circumcision practices globally.

## MATERIALS AND METHODS

This was a retrospective review of circumcisions performed between 2006 and 2022 in men aged one month to fourteen years (mean age: Seven years). The research encompassed a total of 2,000 eight hundred and fifty-three circumcisions performed by the same surgeon using the modified guillotine technique. The patients were chosen based on the availability of complete medical records with operative and follow-up information. The exclusion criteria included patients with congenital penile abnormalities or those who underwent circumcision for medical reasons, such as phimosis, which is not amenable to the standard guillotine technique.

This study used male circumcision performed using the Modified Guillotine Technique (MGT) as an inclusion criterion to investigate its effects on males aged between 1 month and 14 years. The exclusion criteria included anyone suffering from known bleeding disorders, congenital abnormalities of the penis or any condition that the clinical team thought was contraindicated for carrying out circumcision under the protocol being studied.

For ethical reasons and the protection of participant rights, our study protocol was approved by the local Institutional Review Board (IRB), which is responsible for ensuring compliance with these standards. Our ethical guidelines adhered to all procedures detailed in the Declaration of Helsinki and were acquired prior to the beginning of our research from the approval documents.

Informed consent was an essential part of our compliance with the ethics guidelines. Before participating, the guardians of all the minors involved in this investigation were given full explanations of what the study entailed, such as its objectives, the risks/benefits associated with the modified guillotine technique, and their freedom to withdraw their children at any time without fear of facing consequences. These parents/guardians then signed written informed consent forms indicating their comprehension and willingness to complete the project.

### Modified guillotine technique

The modified guillotine technique was applied scrupulously as follows:

**Preparation:** The prepuce from the top of the sulcus coronarius was cleaned freely using clamps fixed at the six and twelve o'clock positions to ensure sufficient exposure and tension (Figure 1).

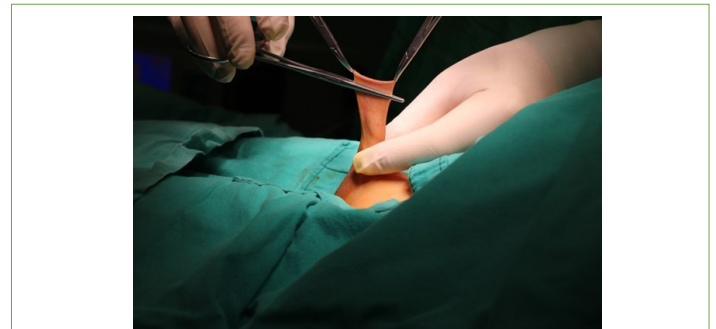


Figure 1: Preparation: Clamping for exposure and tension.

**Initial incision:** The glans was retracted toward the body by the surgeon using a nondominant hand with the assistance of a nurse holding the clamps. The position of the straight clamp on the prepuce was approximately 3-4 mm from the glans, which is adjustable for safety margins depending on the preputial length. After the clamp was placed, an incision was made immediately below it to separate the mucosa and the skin, facilitating skin traction.

**Second incision:** After slight traction was used to return the skin back to its original position, a second line of incision was marked along the penile skin where impressions were left by clamps that had been used before. The skin was suspended, and the incision was placed over this line, taking into account angulation of the glans. The second cut took place underneath the clamp to achieve the desired cosmetic outcome (Figure 2).



Figure 2: Initial and second incision: Placement of clamps and incisions.

Mucosal tissue excision and suturing were performed, followed by meticulous control of the excess bleeding mucosal tissue removed before suturing and tying intermittent stitches on both the skin and mucosa to ensure integrity and an aesthetic appearance (Figure 3).

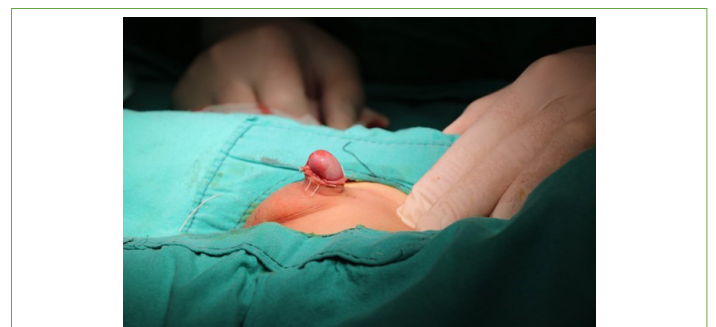


Figure 3: Mucosal tissue excision and suturing.

These two studies focused on circumcision using the Modified Guillotine Technique (MGT). The main interests of the study were safety, efficiency, healing, cosmetic outcomes, and indirect pain management. The primary outcome was glans injury, while wound infection, hematoma, and wound breakage were secondary outcomes. The MGT procedure took shorter durations both during preparation and during surgery than did traditional methods of circumcision. The duration of healing after surgery allowed conclusions to be drawn about its efficacy during the postoperative recovery period. Through parental feedback and clinical evaluations, we could tell if the method was capable of safely providing cosmetically pleasing results. The research did not involve direct pain assessments, such as the Visual Analog Scale (VAS), but it implies that there are no gross injuries associated with MGT, which suggests that there might be indirect relief from pain and hence a more comfortable postoperative period for patients. EVENDOL is given to children younger than six (6) years of age. EVENDOL scores can vary between 0 and 15, with a therapy threshold of 4/15 (Table 1).

**Table 1:** EVENDOL (French Evaluation Enfant Douleur) score.

Behavioral expression	Sign absent	Sign weak or transient	Sign moderate or present about half the time	Sign strong or present almost all the time
Vocal or verbal expression				
Cries and/or screams and/or moans	0	1	2	3
Facial expression				
Furrowed forehead and/or frown, furrowed brow and/or tense mouth	0	1	2	3
Movements				
Restlessness, agitation and/or rigidity	0	1	2	3
Postures				
Antalgic posture and/or protection of the painful area and/or immobility	0	1	2	3
Interaction with the environment				
Can be comforted and/or interested in playing and/or interacts with people	0	1	2	3

SPSS software version 26.0 in Windows was used to analyze the data via univariate, bivariate, and stratified analyses. Contingency tables were constructed for qualitative variables with Pearson's  $\chi^2$  test or Fisher's exact test used wherever necessary when the requirements of the previous test were not met. ANOVA was performed for multiple comparisons of quantitative variables. A Pvalue of 0.05 indicated a significant difference.

## RESULTS

A retrospective review of 2853 circumcisions performed with the Modified Guillotine Technique was performed across different age groups:  $\leq 1$  year (1643 patients, 57.51%), 1 to 6 years (857 patients, 29.9%), and  $>6$  years (353 participants, 12.5%). This analysis aimed to emphasize the improvements in operative efficiency, lower complication rates, and better cosmetic outcomes that are particularly important for avoiding glans injuries.

### Operative and healing times analysis

Figure 2 provides a detailed report on the healing periods and duration of the procedure during preparation in specific age cohorts. The mean operation time was 9.8 minutes, with an SD of approximately 2.8 minutes, indicating a relatively uniform preparation phase across the various age groups; however, the time taken during surgery and the period taken to complete healing varied; the mean duration of operation was approximately six minutes (SD=1.4), while the mean time taken to heal was approximately seven days (SD=2.2). This finding indicates variability because the average operation time was approximately 6.0 ( $\pm 1.4$ ) minutes, while the average healing duration was approximately 7.5 ( $\pm 2$ ) days between the patients who underwent surgery during this period, thus necessitating an individualized approach for managing circumcision that takes into account whether any patient could have some physiological differences due to their age (Table 2).

**Table 2:** Age, operative, and healing times.

Parameter	Estimated Data
Age (years)	
$\leq 1$	1643 participants (57.51%)
1-6	857 participants (29.9%)
$>6$	353 participants (12.5%)
Mean $\pm$ SD (range)	23 $\pm$ 25 (0-120)
Median (IQR)	7(4-35)
Operative time preparation (min)	
Mean $\pm$ SD (range)	9.8 $\pm$ 2.8 (5-16)
Operative time (min)	
Mean $\pm$ SD (range)	6.6 $\pm$ 1.4 (4-10)
Healing time (days)	
Mean $\pm$ SD (range)	7.5 $\pm$ 2.2 (4-15)

### Postoperative adverse events

The study carefully recorded postoperative adverse events to evaluate the safety profile of the Modified Guillotine Technique (Table 3). These included infection, hematoma, edema, and wound dehiscence, among others, as well as bleeding, penile injury, and skin tag removal concerns. It is important to note that infection and hematoma rates were low across all age groups; among these, more than 97% of the patients did not have infections, while roughly all the patients avoided hemorrhage, including one event where fatality occurred after a very long duration of operation. Edema occurred slightly more frequently (2.5%), and wound dehiscence was rare (1.0%). Most importantly, there were no cases of penile injury or excision of the wrong skin, indicating how safe and accurate the alteration to the traditional method is.

**Table 3:** Postoperative adverse events.

Postoperative adverse events	Outcome	Count (Percentage)
Infection	Positive	86 (3.0%)
	Negative	2767 (97.0%)
Hematoma	Positive	57 (2.0%)
	Negative	2796 (98.0%)
Edema	Positive	71 (2.5%)
	Negative	2782 (97.5%)
Wound dehiscence	Positive	29 (1.0%)
	Negative	2824 (99.0%)
Bleeding	Positive	14 (0.5%)
	Negative	2839 (99.5%)
Penile injury	Positive	0 (0%)
	Negative	2853 (100%)
More or less skin removal	Positive	0 (0%)
	Negative	2853 (100%)

### Parental satisfaction and pain assessment

Among parents of all age brackets, more than 98% expressed satisfaction, indicating that the improved technique fulfilled its purpose in terms of the experiences of the patients and caregivers. Although people older than 6 years cannot be evaluated using the VAS and older than 6 years of age do not have EVENDOL scores, this high rate indicates that the procedure was performed successfully with tolerable postoperative pain (Table 4).

### Operative and healing times

Analysis of the operative duration showed an obvious pattern toward extended preparation and surgical duration as patient age increased. For example, young subjects ( $\leq 1$  year) had the shortest preparation time ( $M=8.0$ ;  $SD=1.5$ ), while the shortest surgery time was observed among infants in that category ( $M=6.0$ ;  $SD=0.8$ ), revealing a less complicated anatomical situation that may require faster surgical maneuvers than other groups. On the other hand, older children older than six years of age had longer preparation times (mean=14.5 minutes;  $SD=0.6$ ) and longer operation times (mean=8.5 min;  $SD=0.06$ ), demanding meticulous preparations that included better execution due to their large size/body weight difference compared to younger patients, therefore making it harder for them to perform surgery procedures such as circumcisions compared to others. This gradual increase in healing duration from an average of seven days in the group to eleven days in the  $>6$  years' group suggested that there was an interrelationship between patient age and recovery speed (Table 5).

**Table 4:** Age groups' differences regarding parental satisfaction, VAS Score, and EVENDOL Score.

Measure	$\leq 1$ years (1643 participants)	1-6 years (857 participants)	$>6$ years (353 participants)	P-value	Statistical test
VAS first hour (1-3/4-6/7-9)	N/A	N/A	12%/69%/19%	-	-
VAS second hour (1-3/4-6/7-9)	N/A	N/A	19%/61%/22%	-	-
VAS 24 h (1-3/4-6/7-9)	N/A	N/A	84%/11%/5%	-	-
EVENDOL first hour (4-5/6-10/11-15)	5%/83%/12%	6%/82%/12%	N/A	0.65	For 4-5 $\chi^2=0.72$
EVENDOL second hour (4-5/6-10/11-15)	87%/8%/5%	74%/21%/5%	N/A	0.6	For 4-5: $\chi^2=4.96$
Satisfaction (Yes/No)	98.5%/1.5%	99%/1%	98%/2%	0.7	-

Note:  $\chi^2$ : Chi-square test.

**Table 5:** Age groups' differences regarding operative time preparation/min, operative time/min, and healing time/days.

Age groups	Operative time preparation (min)		Operative time (min)		Healing time (days)		Statistical test (F)	P-value
	Mean	SD	Mean	SD	Mean	SD		
$\leq 1$ year (1643 participants)	8	1.5	6	0.8	7	1.5	1078	$<0.001$
1-6 years (857 participants)	13	0.8	8	0.6	9	1.6	525.6	$<0.001$
$>6$ years (353 participants)	14.5	0.6	8.5	0.6	11	2	216.7	$<0.001$



In four patients, the preputial skin was too short for MGT; instead, a dorsal slit was cut with excision. These cases reiterate the need for personalized patient evaluation, as even though MGT is highly advantageous, there could be situations where it might not work due to specific anatomical conditions at hand. This ensures that both safety and good cosmetic results are optimized, ensuring that the care given to all patients is of the highest quality.

## DISCUSSION

The Modified Guillotine Technique (MGT), an enormous leap forward in pediatric surgery, especially in circumcision, has been used since the beginning of times with religious, cultural and medical implications. This came against the backdrop of our research findings that MGT is a great tool for minimizing glans injuries and enhancing cosmetic results. This finding confirms the conclusion that the procedure has historically developed toward safer and more satisfying methods [12].

Among our 2853 patients who underwent surgery for circumcisions, there were no single gland injuries that could result from conventional methods. Therefore, an analysis of the literature showed that, compared with other studies, MGT can significantly reduce one of the most important complications associated with circumcision through zero incidence [13]. Moreover, MGT and other techniques have the same rate of minor problems, meaning that changes do not add risks; thus, MGT is as safe as was the design [14].

Furthermore, our study upheld the efficiency of the MGT procedure by showing that its operating times are similar to those used in typical procedures within this field. The assumption that modifications would require longer operations is questionable based on this study. In settings where the guillotine method is often used, MGT may be the best choice for circumcisions [15]. This, coupled with the lack of glans injuries, allows MGT to become the best option available.

The parents' input into the cosmetic results implied a high level of satisfaction. Therefore, high levels of satisfaction mean that individuals' expectations about their appearance seem achievable through the use of MGT. When making choices regarding long-term patient happiness and parental considerations during circumcision procedures that focus on cosmetic results as well we must weigh all these facts [16,17].

Our investigation provides compelling evidence in favour of the use of MGT; however, these are restricted findings. Despite our convincing evidence regarding the application of MGT in our study, there are several limitations. These findings cannot be generalized to a large population due to the retrospective nature of the study and the participation of a single surgeon. To obtain a more comprehensive understanding of the efficacy of these methods in various settings, prospective trials involving multiple surgeons with different levels of experience and from several centers are needed [18,19].

Furthermore, the absence of glans injuries is the basis for an indirect assessment of postoperative pain; therefore, additional studies are needed in this area. To statistically analyze the influence of MGT on patient comfort during the recovery phase and the efficacy of pain management, future studies should employ direct assessment methods [20].

Perhaps the use of MGT, where circumcision is frequently performed, has the potential to regularize procedures, thus reducing variation in results associated with factors such as surgeon preference and technique choice. The continued use of these criteria may reduce complications related to circumcision worldwide, resulting in healthier and more acceptable procedures [21,22].

The Modified Guillotine Technique represents a significant breakthrough compared to traditional methods of circumcision, with particular emphasis on reducing injury to the penile glans and providing good cosmetic results. As a result, this research outcome significantly contributes to understanding its efficacy and safety, paving the way for wider deployment of this technique. For example, as one of the most common surgeries performed throughout the world, steps such as those taken by MGT will be crucial in developing surgeries for safer outcomes that are more effective and appealing aesthetically [23].

More research needs to concentrate on addressing the limitations encountered earlier in our study, exploring the use of MGT in different surgical settings, and investigating other advantages due to the use of MGT, such as patient pain relief and recovery processes. These aspects must be investigated by researchers. By doing so, not only can the importance attached to MGT be emphasized, but continuity should also be maintained in the evolution of circumcision toward offering the best therapy for patients.

## CONCLUSION

The introduction of the Modified Guillotine Technique (MGT) in regions where circumcision is routine has significant benefits. These modifications can greatly reduce the incidence of glans injuries, which are major concerns associated with the usual Guillotine technique. Our evaluation compared MGT with traditional Guillotine and other types of circumcision in terms of complication rates, aesthetic satisfaction, and operation time. In this study, there was no marked difference in the operative time between MGT and the conventional Guillotine technique, implying that the efficiency was not compromised by these modifications. Introduction of MGT addresses an essential safety concern without increasing the duration of the circumcision process. This approach is important because it shows that advances in patient safety and cosmetic results can be achieved without additional time being spent on them, which impedes the adoption of novel surgical procedures. Furthermore, the similarity in complications between MGT, the traditional Guillotine method, and other techniques demonstrates that there are no new risks introduced but rather substantial improvements in safety and visual outcomes.

## STATEMENTS AND DECLARATIONS

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