A COMPARATIVE STUDY OF CONVENTIONAL AND SUTURE LESS CIRCUMCISION

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Abstract

"Circumcision is the oldest and the most common surgical procedure in urology. It comprises the removal of the skin covering the glans and is performed for various reasons such as medical, religious and traditional. The most common medical indications for circumcision are phimos is, paraphimos is, recurrent banalities and posth it is. Many studies have observed that circumcision increases penile hygiene and decreases the risk so of penile cancer and urinarytract infections.Surgically,circumcision is an easy technique to learn and perform. Various surgical techniques can be used to perform this procedure with different results and complications. In this study the fundamentals and clinical applications of the staplers to evaluate the benefits of its use versus the conventional procedure for circumcision in adults are described in terms of duration of the operation, complications, pain and cosmetic appearance."

Introduction

"The circumcision wound was closed by absorbable sutures traditionally. Currently, alternative methods are being utilized to overcome the shortcomings of the conventional closure like postoperative pain, time consumed and cosmetic problems. The most recent advancement is the technique of closure carrying out without sutures. In the year 1940′s, variety of cyanoa cry late adhesives were developed. Cyanoacrylate adhesives are series of homologous compounds known as alkyl-cyanoacrylates. These glues get polymerize on contact with basic substances such as blood or water. The polymerization occurs at room temperature and does not require the use of solvent or an added catalyst. The material can be spread easily in a thin film, readily wets the surfaces to which it is applied and produces very

little heat. It should not be placed inside the wound. Suture less circumcision is preferred over conventional circumcision because it requires less operative period, there is less pain, there is better healing, better satisfaction of patient, there are less complications, there is better cosmes is, there is better safety, It requires less post-operative stay."

"The present study was conducted at a tertiary health care institute to do the comparative analysis of conventional and suture less methods of male circumcision."

Aim of the study: Comparative study between conventional and suture less circumcision.

Objective: To do a comparative study between conventional and suture less circumcision in terms of:
i. Operative time, ii. Pain score, iii. Blood loss, iv. Healing time, v. Patient satisfaction, vi. Post-operative stay and vii. Post-operative complications

Anatomy of Human Penis

"The penis is a external male genital organ which is located within the urogenital triangle between the perineal membrane superiorly and deep perineal fasciain feriorly. Its composition divides it into 3 parts: the glans, body, and root. Dorsally, it is composed of the paired corpora cavernosa and ventrally the corpus spongiosum which contains the urethra. Penis is the male organ of copulation and is made up of: a) Root b) Body c) Glans penis"

Root: "The root of penis is situated in the superficial perineal pouch. It is composed of three masses of erectile tissue namely two crura and one bulb. Each crus is covered by ischiocavernosus."

Body: "The middle portion of the penis is suspended and known as the body of the penis. The free portion of penis is completely eneveloped by the skin and discontinuous with the root in front of lower part of pubic symphysis. "

Glans Penis: "The corpus spongiosum is forward continuation of bulb of penis. Its terminal part is expanded to form conical enlargement called as *glans penis*. Throughout its whole length it is traversed by urethra."

"The tip of glans contains the opening to the urethra known as the *meatus*. It is also surrounded by a fibrous sheath. The prepuce or foreskin is the second skin layer that covers the glans penis. The median fold of skin is called *frenulum* of the prepuce which connects it to the urethral surface of the penis glans."

Terminologies

1. **Phimosis –** Phimosisis defined as inability to retract the foreskin beyond coronaglan disdue to narrowed preputial opening.

a) Physiological Phimosis

- At birth the preputial skin is adherent to glans penis normally.
- Epithelial debris (smegma) accumulate sunderprepuce and separate sprepuce from glans.
- By 3 years, foreskin can be retracted.
- "Physiological phimosis exists when foreskin is nonrectractile but all other aspects including histological analysis is normal."
- "In addition, it was noted that 8 % of 7 year old shave aphysiological phimosis which resolves spontaneously leaving a 1% incidence at puberty."
- "It exhibits flowering during attempted retraction and blanching of preputial skin proximal to preputial orifice."
- "Preputial adhesions, pearls, ballooning on micturition and non-retractile foreskin are physiological causes of phimosis and parents can reassured."
- "It is managed conservatively."

b) Pathological or Secondary Phimosis

- Apathological phimosis is one where the preputialorifice itself is abnormal and scarred.
- Normally it is possible to retract prepuce beyond coronagl and is
- Duetolocal disease, prepuce cannot be retracted beyond corona gland is then it is called secondary orpathological phimos is.
- Causes–

a) Recurrent balanoposth it is causing adhesions of prepuceto plans penis.
b) Caglanspenis.
c) Prepucialinjury duet of orcefulretraction can cause ulceration of prepuce, fibrosis and secondary phimosis.

- The incidence is suggested to be about 1.5 % at the age of 17years.

- Histological analysis of such foreskins invariably shows balanitisxeroti caobliterans.

"These conditions are completely benign and do not require circumcision.Preputial pearls are retained sebaceous secretions (smegma) produced by the inner foreskin layer that fail to be released because of preputial adhesions. They always resolve spontaneously. A redundant foreskin causes only pooling of urine and is treated by gently pulling the foreskin back to take up any "slack" when passing urine and then drying the foreskin at the end of micturition."

A single study examined the foreskin length and risk of penile cancer and concluded that the presence of a long foreskin increased the risk but only in the presence of phimosis.

Different Types of Penis

1. Buried Penis

"Buried penis is a true congenital disorder in which a penis of normal size lacks the proper sheath of skin and lies hidden beneath the integument of the abdomen, thigh or scrotum. The literature also refers to this condition as a hidden or concealed penis".

"This condition is usually identified in neonates or obese prepubertal boys; however, it can also be seen in adults and has been observed in both circumcised and uncircumcised individuals. Marginal cases may not be diagnosed until adulthoodwhen increased fat deposition accentuates the problem. In most congenital pediatric cases, the buried penis is self-limited. In untreated adults, however, the condition tends to worsen as the abdominal pannus continues to grow."

2. Trapped Penis

"It is a condition in which the penis becomes inconspicuous secondary to acicatricial scar usually after overzealous circumcision."

3. Webbed penis

"It is characterized by obscuration of the penile shaft by scrotal skin webs at the penoscrotal junction."

4. Micropenis (also known as Microphallus)

"It represents a penis less than 2 standard deviations below the mean in length when measured in the stretched state".

5. Diminutive Penis

"It is a penis that is small, malformed or both secondary to epispadias, exstrophy, severe hypospadias, chromosomal abnormalities or intersex conditions."

Indications of Circumcision

- Phimosis is the most common indication for adult circumcision
- Paraphimosis
- Hypospadias
- Balanitis without phimosis
- Balanoposthitis
- Redundant foreskin
- Urinary tract infection - It benefits in reducing the risk of urinary tract infections
- Condyloma
- Bowen disease
- Carcinoma (Penile or cervical cancer)
- Trauma
- Disease prophylaxis (eg, HIV infection and sexually transmitted diseases –it has shown to reduce the risk of HIV transmission and other sexually transmitted diseases.)
- Patient choice

Role of Circumcision

1. Prostatic Cancer

"Citing a link between the intact prepuce and sexually transmitted infection, some authorities have gone as far as suggesting that circumcision protects against prostate cancer."

2. Genital Lichen Planus

"Genital lichen sclerosus appears to be a disease generally restricted to uncircumcised males and is often cured by circumcision."

3. Premature Ejaculation

"Additionally, removal of foreskin remnants has shown to be an effective modality in select patients with premature ejaculation."

4. Prevention of penile cancer

"Penile cancer is more common in uncircumcised men but there is little information on the role of ritual circumcision and its timing in the aetiology of penile cancer.[5] A population based case-control study carried out in the United States between 1979 and 1998

included 137 men with penile cancer diagnosed (75 with in situ cancer, 62 with invasive cancer) and 671 controls identified through random digit dialling. Penile conditions such as tear, rash and injury were associated with an increased risk of cancer. Among men not circumcised in childhood, phimosis was strongly associated with the development of invasive penile cancer (odds ratio 11.4 (95% CI 5.0 to 25.9)) but when the researchers excluded phimosis the presence of a foreskin did not increase the risk of invasive penile cancer (odds ratio 0.5 (0.1 to 2.5)). There was, however, a strong association between human papillomavirus infection and the development of penile cancer regardless of circumcision status. It is clear that factors other than circumcision are involved in the aetiology of penile cancer as highlighted by one report that 42% of men with penile cancer were previously circumcised."

Techniques of Circumcision

Excision

i. Sleeve Resection: "The prepuce is retracted over the glans penis and a circumferential incision is made around the shaft as far back as the scar line is to be placed, usually distal to the corona. The prepuce is returned to cover the glans and another circumferential incision is made around the shaft at the same position as the first one. A longitudinal cut is made between the two circumferential ones and thestrip of skin removed. The free raw edges are then sutured. The frenulum can be included in the main cutting or can be cut separately if desired. The glans and frenulum are not protected as such and care is taken not to injure them." "There are several modifications of the sleeve resection. Bloodless circumcision with the use of bipolar diathermy is described. Some use gauze pack placed between the glans and the inner layer of the prepuce both for tension and hemostasis. Other described the use of an artery forceps to crush the prepuce before excision. These and many more are aimed to reduce complications of sleeve technique."

Shield and Clamp: "The prototype method in shield and clamp is the Mogen clamp. In this method,the prepuce is pulled out distal to the glans and a metal shield is slid over the prepuce immediately distal to the glans. A scalpel is used to remove the redundant prepuce distal to the shield. The glans is protected by the shield and the frenulum is not involved in the excision. The inner preputial layer may then be slit back behind the glans and excised this ensure full exposure of the glans after healing. No stitching is done, the wound simply being

bandaged to achieve hemostasis. The glans and the frenulum are shielded from the knife and thus are off the harm's way. Injury to the glans and urethrocutaneous fistula is uncommon; bleeding is, however, a major concern in this method".

ii. Smart Klamp: "This works in the same way as the Tara Klamp. By trapping the prepuce between an outer ring and an inner tube, the device cuts off the blood supply to the prepuce. Smart Klamp consists of separate inner tube and outer locking part with the locking arms at the side. Once the klamp is in place the excess foreskin is removed using the inside of the baseplate as a guide. The glans and frenulum are thus protected."

iii. Gomco: "A metal bell is placed over the glans after the prepuce is fully retracted. The prepuce is then replaced over it this is facilitated by dorsal slit. A metal plate with a machined under surface in which the rim of the bell sits is placed over the bell. The prepuce thus lies between the plate and the bell. A tensioning bar is hooked under a T-shaped piece on the top of the bell and screwed down tight to the metal plate; this traps the foreskin in position. A scalpel is run around the upper surface of the plate to remove the prepuce after adequate strangulation. Hemorrhage is one of the complication here hence the application of hemostatic stitches. Catastrophe resulting in whole penile loss occurs when this procedure is done with diathermy. Its main merit like other shield method is that the glans and the frenulum are protected".

iv. Forceps Guided: "In this technique, the prepuce is freed from the glans and pulled out in front of the glans. A pair of stout locking forceps is clamped across it parallel to the corona and immediately in front of the glans. The scalpel is used to remove prepuce flush to the forceps. The glans is protected by the forceps; it is similar to the guillotine method. This method does not cut the frenulum but it can be removed before or after the circumcision if desired."

v. Laser Circumcision: "For its many beneficial physical properties as regards precision and sealing ofcut surfaces, laser circumcision is possible. There have been some reports of its use inhemophilia patients in Israel. Reports of this in literature are, however, rare."

COMPLICATIONS OF CIRCUMCISION

1. Bleeding: Excessive bleeding as complication of circumcision in reported cases ranges from 0.1% to 35%. Transfusion for this complication is, however, unusual. It is more common with the excision method and when less attention is placed on hemostasis during the procedure.

2. Concealed Penis: In this, an excess of skin is removed from the penile shaft while not enough of the inner preputial layer has been removed. The new preputial orifice is distal to the tip of the penis, the penile shaft is forced into the suprapubic fat, the stenotic preputialring that results, lies at or just above the abdominal skin level.

3. Phimosis: This results when insufficient outer and inner preputial layers has been removed. Following healing with fibrosis, the new preputial opening is too tight to allow preputial retraction. Repeat circumcision is mandatory to correct this preventable complication.

4. Skin Bridge: Another adverse result of circumcision is the formation of a skin bridge between the penile shaft and the glans. Smegma may accumulate under the skin bridges. Additionally, these bridges may tether the erect penis with resultant pain or penile curvature. Treatment is to release the bridges.

5. Infection: Circumcision wound may become infected as in any surgical procedure. The incidence of infection in one series of neonatal circumcisions was 0.4% while in a series of older boys it was as high as 10%. Most of the infections are minor and of little or no consequence. However, major morbidity has been reported including major skin loss, necrotizing fascitis, staphylococcal scalded skin syndrome, Fournier's gangrene, generalized sepsis and meningitis. Some of these complications rarely have resulted in severe permanent disability or death.[11]

“One concern is that the trials of male circumcision conducted in Africa may not be applicable to the United States. Despite 3 decades of safe-sex education in the United States, STIs continue to cause substantial morbidity and mortality. It is estimated that more than 1 million people are living with HIV/AIDS and more than 50 000 new infections occur annually. Additional estimates suggest that there are 3 million to 5 million annual cases of trichomonias is in the United States and the prevalence of bacterial vaginos is among women

of reproductive age is approximately 30%. One of the most common STIs is HPV which causes genital warts and penile and cervical cancer. Observational studies in the United States show that male circumcision is associated with reduced risk of men acquiring heterosexual HIV and HR-HPV infection. Thus, STIs are a persistent problem in the United States, and malecircumcision may provide individual and societal benefits".

"Some who oppose male circumcision cite anecdotal reports that male circumcision can cause sexual dysfunction. The male circumcision trials evaluated sexual satisfaction in adult men and their female partners before and after the procedure and compared men randomized to male circumcision with uncircumcised controls. There were no significant differences in male sexual satisfaction or dysfunction among trial participants and in one trial, circumcised men reported increased penile sensitivity and enhanced ease of reaching orgasm. In addition, 97% of female partners reported either no change or improved sexual satisfaction after their male partner was circumcised."

Material and Methods

Study Design: "Study design is observational prospective study."

Study Site: "The study was conducted in Department of GeneralSurgery, Krishna Institute of Medical Sciences, Karad."

Study Duration: "December 2019 to June 2021 (18 Months)"

Source of Data: "Patients admitted to KIMS and presenting as case of Phimosis, balanopasthit is, recurrent balanoposthitis, balanitis xerotica obliterans, recurrent UTI"

Sample Size: " 13 cases of conventional circumcision 13 cases of sutureless circumcision." Calculated by formula:

$$n = \frac{SDs^2+SDc^2}{(Ms-Mc)^2} \times (Z_{1-\frac{\alpha}{2}} + Z_\beta)^2$$

Where, n = Sample size
SDs = Standard deviation in stapler circumcision
SDc = Standard deviation in conventional circumcision
Ms = Mean of stapler circumcision
Mc = Mean of conventional circumcision
$Z_{1-\frac{\alpha}{2}}$ = 95% Confidence level
Z_β = 80% Power

Stapler group			Conventional group		
Ms		SDs	Mc		SDc
12.5	±	1.8	14.4	±	2.1

$$n = \frac{(SDs^2+SDc^2)}{(Ms-Mc)^2} \times (Z_{1-\frac{\alpha}{2}} + Z_\beta)^2$$

Taking $(Z_{1-\frac{\alpha}{2}} + Z_\beta)^2 = 7.84$ and putting above value

We get,

$n = 16.54$

Hence, in this study total 13 patients were enrolled in each group (conventional and sutureless)

Statistical Analysis

- The data was enetered with the help of MS excel software.
- The data was represented in the form of tables and charts for frequency analysis.
- The data was analysed with the help of SPSS version 22 software.
- For qualitative variables, chi-square test was used to compare the variables
- For quantitative variables, students t-test was used to compare and analyse the difference between two variables.

Post-Operative Parameters

"In the current study **Post-operative Parameters** among the subjects was assessed. It was observed that Mean Healing time in Conventional group was 14.4 days and in Sutureless group was 12.5 days. Mean Satisfaction in Conventional group was 90% and in Sutureless group was 92%. Post-operative hospital stay Conventional group was 3.5 days and in Sutureless group was 2.2 days."

Parameters	Conventional Group	Sutureless Group	Significance
Mean Healing Time	14.4 ± 0.87 days	12.5 ± 1.05 days	The t-value is 5.06803. The p-value is .000017. The result is significant at p < .05.
Mean Satisfaction	90 ± 1.47 %	92 ± 1.77 %	The t-value is 3.1225. The p-value is .002315. The result is significant at p < .05.
Post-operative Hospital Stay	3.5 ± 0.51 days	2.2 ± 0.43 days	The t-value is 6.94022. The p-value is < .00001. The result is significant at p < .05

Discussion

"Male circumcision is removal of the foreskin (prepucial skin) from the penis. According to the World Health Organization (WHO), global estimates suggest that 30% of males are circumcised. In India incidence of circumcision in general population is approximately 33%. Most circumcisions are performed during adolescence for cultural or religious reasons."

"The WHO recommends three conventional methods to perform circumcision, and these techniques are used worldwide. However, conventional circumcision still has some drawbacks: it requires training; it may have a high complication rate, especially in some African countries, where circumcision is often performed by poorly trained and underequipped health workers; and it takes time, even when performed by experienced surgeons which challenges the medical MC scale-up for HIV prevention in Africa. The circular stapler is a new device used to performcircumcision. It was commercially developed in China and is applied in some Chinesehospitals. In line with a study by Yuan et al., our data show that MC with a stapler hassome advantages: a short operative time, minimal pain, and a low blood loss volume comparable with those of another new circumcision device, the Chinese Shang Ring. Therefore, the stapler also has the potential to be used in high-volume settings by health care providers with minimal training and experience because of its simplicity, short operative and recovery times. Currently, its most substantial deterrent to widespread use is cost. A reusable version of the circular stapler might be a solution."

Diagnosis

"In the current study the diagnosis among the subjects was assessed. It was observed that Balanitis Xerotica Obliterans was reported in 15.38% subjects in first group, while 7.69% subjects in second group, Congenital phimosis was reported in 7.69% subjects in first group, while 15.38% subjects in second group, Recurrent balanoposthit is was reported in 30.77% subjects in both groups, Recurrent UTI was reported in 23.08% subjects in both groups. Others reported in 23.08% subjects inboth groups."

Intra-Operative Parameters

"In the current study **Intra-operative Parameters** among the subjects was assessed. It was observed that Mean Operating time in Conventional group was 24.2 min and in Sutureless group was 6.8 min, Mean Blood loss in Conventional group was 9.4 ml and in Sutureless group was 1.8 ml, Mean Pain score in Conventional group was 5.8 and in Sutureless group was 4".

Post-Operative Parameters

"In the current study **Post-operative Parameters** among the subjects was assessed. It was observed that Mean Healing time in Conventional group was 14.4 days and in Sutureless group was 12.5 days, Mean Satisfaction in Conventional group was 90% and in Sutureless group was 92%, Post operative hospital stay Conventional group was 3.5 days and in Sutureless group was 2.2 days"

Complications

XD Jin et al in their study observed that "the stapler group had a significantly lower complication rate than did the conventional group (2.7% vs 7.8%, respectively; $P<0.01$)."

Punit Tiwari et al in their study observed "less complications in both the groups. Tissue glue group had high rate of partial dehiscence as compared to suture group but lesser wound inflammation, bleeding or hematoma. But none of these findings could reach to statistically considerable level".

Summary and Conclusion

"Based on the literature and experience, the stapler still has some advantages over the Shang

Ring. First, the foreskin is cut completely with the stapler which causes less pain after the operation. In contrast, patients who undergo circumcision with the Shang Ring experience pain for 7 to 16 days until the ring is removed. Based on patients' self-reports, this postoperative pain can be very severe when spontaneous or nocturnal erection occurs. Second, patients who undergo stapler circumcision have shorter healing time. In patients treated with the Shang Ring, removal of the foreskin is obtained by necrosis which leads to a relatively ischemic edge. After ring removal, more time is required to reconstruct the local blood circulation for wound healing. Third, patients who undergo stapler circumcision have less wound dehiscence. Patients treated with the Shang Ring have a greater possibility of wound dehiscence because no suturing is performed around the wound. Wound dehiscence usuallydevelops when spontaneous or nocturnal erection occurs. However, these advantages should be further tested in a well-designed head-to-head randomized clinical trial."

In the present study" majority of the subjects belonged to the age group of 26 to 35 years (38.46% and 46.15% in either group), followed by 36 to 45 years (15.38% and 23.08% in either group.)."

"Among the commonest complications in the Conventional group: Bleeding (15.38%), Wound dehiscence (7.69%), edema (23.08%), and infection (15.38%)". Sutureless group did not report any case of bleeding, edema and infection.

1. Mean Healing time in Conventional group was 14.4 days and in Sutureless group was 12.5 days, Mean Satisfaction in Conventional group was 90% and in Sutureless group was 92%, Post operative hospital stay Conventional group was 3.5 days and in Sutureless group was 2.2 days
2. Bleeding, wound dehiscence, edema and infection were the common complications reported in the conventional group, whereas Sutureless group did not report any case of bleeding, edema and infection.
3. Thus the sutureless technique is an easy and user-friendly technique for performing male circumcision. It is associated with a shorter operative time, lower blood loss volume, and fewer postoperative complications than conventional circumcision. This new technique may greatly facilitate and standardize circumcision procedures.

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