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Comparison of the surgical outcomes of minimal excision and elliptical excision techniques in treatment of epidermal inclusion cysts: A prospective randomized study

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OBJECTIVE: To compare results of surgery of minimal excision technique and elliptical excision in surgical management of epidermal cysts.

METHODS: In a 24-month period, from 2012 to 2015, 364 patients with benign and not infected epidermal cysts were surgically managed with minimal excision (n= 178) or elliptical excision (n=186) technique. Patient information, volume, and place of lesion, length of wound, time of surgical procedure and recurrence were evaluated.

RESULTS: The mean lengths of the wounds in the minimal excision and elliptical excision groups were 2.4 ± 0.50 and 2.6 ± 0.40 cm, respectively (P<0.05). Mean operative time was significantly shorter in the minimal excision technique (6.0 ± 2.00 minutes) compared to that of elliptical excision technique (11 ± 3.00 minutes) (P<0.05). There was no difference with significance level 0.001 in the recurrence rate in minimal excision (2.6 ± 0.30 %) compared to that of elliptical excision technique (2.4 ± 0.20%) (P>0.05).

CONCLUSION: Minimal excision produced a superior cosmetic result. Epidermal inclusion cysts measuring less than 3 cm that were observed on the head or cosmetically important zone were optimally managed with minimal excision technique.

Keywords: Epidermal cyst, minimal excision, elliptical excision

Introduction

It has been reported that epidermal cysts are mostly benign tumors that are usually observed on the body, behind the ears, cervical area and complexion with dome like appearance [1]. Operative management is mostly adopted to treat the affection that usually ends up scar formation [2-5]. Attachment of the apical part of an epidermal cyst is to the dermal layer of cutaneous and the rest of the cyst is placed immediately under the skin with a loose attachment to the subcutaneous.

This affection is also called sebaceous cyst and includes epidermal cyst, keratin cyst, epithelial cyst, and epidermoid cyst. These cysts originate from a ruptured pilosebaceous follicle associated with acne. The obstructed duct of sebaceous gland in the hair follicle is turned into a narrow and lengthened canal that finds a way to the surface of the cutaneous [1]. These cysts also originate from exertion of trauma to the surface of cutaneous or a developmental defect of the sebaceous duct. The contents of the cysts consist of keratin and lipids, and because of decomposition and bacterial infection of these contents, they become odorous. They are ruptured spontaneously and a doughy discharge is appeared on the cutaneous. [1]. This affection ends up a severe inflammation and subsequent scar formation results in complication in surgical management of the affection [1].

To the best knowledge of the authors, the literature is poor regarding comparison of the long-term surgical management of the minimal excision technique and elliptical excision in a prospective, randomized study. The object of the study was to compare

results of surgery of minimal excision technique and elliptical excision in surgical management of epidermal cysts.

Material and Methods

Spontaneous rupture o the epidermal cysts could be as a result of infection. Surgical removal of the cyst takes time and suturing is needed to close the defect [6]. One of the successful and less invasive methods is the minimal excision technique. In this method a 2- to 3-mm incision is made and cyst contents and wall are expelled out. In this method fingers are pressed form sided of the lesion to make the wall loose and then the sac is removed easily. The resultant cutaneous defect could be closed using one stitch. After application of compression a sterile tampon is placed on the resulted wound [1]. Adoption of a minimal excision operation as a technique to expel out the cysts has been reported by others [1,7] Overall, this technique bears advantages like simplicity of the method, less scar formation and accelerated wound healing time.

Patients

During June 2012 to September 2015, 364 patients (18 to 78 years of age) with non-infected epidermal cysts were entered to the present investigation. The patients were informed and they were consent to enter to the study. Exclusion criteria were: cysts larger than 3 cm, infected or inflamed cysts, recurrent cysts, cysts suspected to malignancy, those with uncertain diagnosis, cysts located in the forehead and patients who could not be followed up. The patients were randomized into two odd and even numbers. Those with odd number received minimal excision operation and those with even number received the conventional method.

Surgical Procedures

All the surgical operations were done by first author. The minimal excision operation was done based on a method described by others [1]. Briefly, the skin overlying the site was prepped and anesthetized with 1 percent lidocaine without epinephrine. A stab incision (3- 5 mm) was made on the central part of the cyst. A hemostat was inserted into the cyst and the tips of the hemostat were opened. Then with application of compression the cyst contents were expelled out via the opening. Following removal of the hemostat, the surgeon used his thumbs to expel out contents of the cyst contents. If required the hemostat could again be inserted, to help with discharge of the materials. After forceful and complete discharge of the contents, the capsule of the bottom of the cyst was expelled out using hemostat. The whole membrane of the cyst was taken out via the opening. Finally, the surgeon inspected the wound ta make sure that the whole wall of cyst was taken out. Using a sterile tampon and with direct pressure the wound was compressed. Then a topical antibiotic ointment was put on the wound and the patient was asked to hold direct pressure for some time along with tampon.

The conventional elliptical excision was also done based on a method described by others [6]. The surgical preparation and anesthesia were performed the same as minimal excision technique. However, the wound was closed using sutures. Based on volume of the cyst, cutaneous tension line, an elliptical excision was made. The major axis of the excision was as small as possible to achieve optimum cosmetic result. Patient`s data records and follow-up, age and gender of the patient, time of operation, date of surgical procedures, place and the original volume of the cyst and length of the sutured wound were recorded. After a period of 24-month follow-up all 364 patients were contacted by a phone call. Data gathered by phone call were the recurrence and presence of any complications.

Statistical Analysis

Shapiro-Wilk test was used to check the normality of data. SPSS software (version 11.0, SSPS, Chicago, IL. USA) was used forsStatistical analyses. Two-sided p values were taken by Student's t-tests to reveal the difference in original volume of the cyst, length of the wound, and operative time in groups. P-value of less than 0.05 was set significant.

Results

Of the 354 randomized patients with age range from 18 to 78, 178 and 186 were assigned to the minimal and elliptical excision groups, respectively. The minimal excision group included 80 males and 98 were females. The elliptical excision group included 91 males and 95 females. The mean ages of the two groups did not show significant difference (P = 0.583). If the cyst was not ruptured or inflamed, the place of a cyst did not impact selection of the case. Table 1 shows our findings when both groups were compared. The mean original size of the cysts in the minimal excision group was 1.5 ± 0.70. The mean original size in the elliptical excision group was 1.7 ± 0.60. There was no statistically significant difference between the original sizes in both groups. The mean length of wounds in the minimal excision group was 2.4 ± 0.50 cm, and the wound length in the elliptical excision group was 2.6 ± 0.40 cm (P=0.001). The mean time of operation required for minimal excision was 6.0 ± 2.00 minutes, and it was significantly shorter than that for the elliptical excision group 11 ± 3.00 minutes (P=0.001, i.e. statistically significant).

The incidence of recurrence in both techniques is shown in Table 1. The overall recurrence rate in the elliptical group was 2.4 ± 0.20 %. There recurrence rate in the minimal excision group was 2.6 ± 0.30 that was not significantly different from that of the elliptical group (P = 0.653).

Discussion

There are some particular situations that need to be considered in epidermal cysts that are simple lesions with multiple aspects. These cysts could be associated with cutaneous lipomas or fibromas and osteomas [1]. There may be some confusion between dermoid cysts of the head and epidermoid cysts and excision of a dermoid cyst can end up a wound with intracranial communication [1]. Sometimes epidermal cysts could be con-

Table 1. Patient data and surgical outcomes of minimal and elliptical excision techniques in 364 patients candidate for epidermal inclusion cyst removal. Data are expressed as Mean ± SD.

Patients Data	Minimal Excision Technique	Elliptical Excision Technique	*P* Value
Location of Cysts	Head	Head	N/A
Number of Patients	178 ± 0.00	186 ± 0.00	P = 0.658
Follow up (Months)	24 ± 0.00	24 ± 0.00	P = 0.712
Age of patients	45.0 ± 27.00	46 ± 29.00	P = 0.583
Mean Size of Cysts (cm)	1.5 ± 0.70	1.7 ± 0.60	P = 0.567
Mean Length of Wound (cm)	2.4 ± 0.50*	2.6 ± 0.40	P = 0.001
Procedure time (min)	6.0 ± 2.00*	11 ± 3.00	P = 0.001
Recurrence (%)	2.6 ± 0.30	2.4 ± 0.20	P = 0.653

** Results were statistically significantly different from those obtained by of elliptical excision technique (P<0.05), Student's t-test.*

sidered complicated due to association with some malignancy like basal cell and squamous cell carcinoma. Where solid tumors or unusual findings are encountered, standard histologic assessments should be taken into consideration [1].

Because epidermal cysts may interfere with cosmetic concerns and or be very troublesome, the affected patients ask for surgical management of the case. It is a regular affection in daily practice and surgeons hardly ever search for novel surgical management. Nonetheless, cosmetic concerns of the patients are being increased nowadays. Therefore, minimally invasive surgical techniques for the removal of these cysts have been introduced in several literatures [8-14].

The rationale to adopt minimally invasive surgical techniques is simplicity, less invasiveness, less bleeding, reduced scarring, and decreased healing time. However, objective measurements associated with these advantages are missing.

In the present randomized study, it was demonstrated that the minimal excision technique for removal of epidermal cysts actually reduced the length of the wound, resulted in improved cosmetic result, shortened the time of procedure, and ended up decreased complication rate. The minimal excision technique is a satisfactory alternative method to excise non-infected epidermal cysts. Reduced surgical wound length could be mentioned a one of the great advantages of the minimal excision technique. In the present study the mean value for length of the wound in the minimal excision group was only 2.4 ± 0.50 cm with greatest result not exceeding 3 cm. In the present study, regardless the original size of the cyst, the resultant wound length from the minimal excision method did not exceed 3 cm. This is considered as graet benefit of the minimal excision technique when dealing with cysts on the areas of cosmetic concern. The surgeon in the present study did his best to minimize size of wounds treated by with conventional excision. However, the wounds created by conventional method were still larger than those of minimal excision, especially when excising a cysts larger than 1 cm, because the long axis should be kept about two to three times the length of the short axis. The minimal excision procedure may seem more difficult and time consuming when managing large cysts, larger than 2 cm in size. However, the procedure can still be performed smoothly with patience. In the present study, the size of a cyst did not make a difference in the case selection and no conversion to an conventional excision was required. When the surgical removal of 1 to 2 cm sized cysts in an area of cosmetic concern is the case, the privilege of minimal excision becomes significant. Other minimally invasive methods could also end up improved cosmetic results than conventional excision. Carbon dioxide laser is adopted to create several opening and expell out the cystic content, however, the basis of this technique has not been well investigated. Others have reported to make 2 to 3mm opening over the cyst [13]. The minimal excision method could result in a round to oval-shaped puncture for facilitated manipulation.

Another advantage of the minimal excision technique in our investigation was the reduced surgery time. The required mean time for operation in minimal excision method was significantly shorter than that for conventional method. For those surgical interventions that only simple equipment are available, the minimal excision method is a very rapid procedure. Sometimes expelling out the contents and wall of cyst was time consuming. However, the surgeon could save time because hemostasis and wound closure was needed. Because small openings in wounds are created in the minimal excision approach, no closure of wound is required. The place of a cyst did not impact selection of our cases if the cyst was not ruptured or inflamed. Our recurrencet rates Recurrence rates of the minimal excision technique method was 2.6 ± 0.30 %, which was considered to be low. Compared to the previous reports no significant difference was observed in the recurrence rates. A recurrence rate of 0.66% by minimal excision within an18-month follow-up has been reported [13]. It has been reported that the recurrence rate using

punch incision method was 3.6% by chart review and 8.3% by further survey [14]. It was reported that cysts excised from the back or and ear had the highest recurrence rates compared to those excised from other places. It is believed that all surgical methods for removal of cysts bear a significant risk of recurrence when the cyst wall is not completely removed.

It should be taken into consideration that we included only non-ruptured and non-inflamed cysts into the present investigation. The findings of the present investigation revealed that the minimal excision method was more pleased for the excision of non-inflamed cysts. However, the application of this method to ruptured cysts remains to be further investigated.

Conclusion

This is the first randomized prospective study to statistically compare the results between conventional and minimal excision techniques for surgical management of epidermal cysts. The findings of present study has showned that the minimal excision technique has resulted in superior cosmetic results while keeping less scarring. This technique of the minimal excision technique reduced the length of the postoperative scar wound regardless the original size of the cyst. The patients with an epidermal cyst in an areas of cosmetic concern are the best candidate for this method. When properly performed, the minimal excision metrhod was a satisfactory method to remove non-infected epidermal cysts.

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