ISSN: 0975-833X

Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 8, Issue, 03, pp. 27648-27650, March, 2016

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

RESEARCH ARTICLE

IS SCARLESS SURGERY POSSIBLE: A COMPARATIVE STUDY

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ARTICLE INFO

Article History:
Received 14th December, 2015
Received in revised form
24th January, 2016
Accepted 28th February, 2016
Published online 16th March, 2016

Key words:
Cyanoacrylate,
Tissues glue,
Skin closure.

ABSTRACT

Patient always wants scarless surgery, lesser pain and less cosmetic scar and this can be possible with use of cyanoacrylate adhesive glue. Since their discovery in 1949, cyanoacrylate compounds have evoked interest as being the ideal "tissue glue". Several different forms of this compound have been developed in order to eliminate tissue toxicity. In our study, we have described a technique of sutureless closure of operative skin wounds and compared it to closure of skin with nylon. Inter-group comparison was carried out with respect to the time required for closure, rate of infection, cosmesis and patient acceptance. N-butyl 2-cyanoacrylate was used for sutureless skin closure in 50 patients and compared with skin closure with sutures. The time taken to close the wounds with cyanoacrylate was found to be significantly less, the cosmetic outcome better and patient acceptability higher than when sutures were used.

Citation: Prateek Shakya, Shahi, K. S. and Bhuvan Chaudhary, 2016. "Is scarless surgery possible: A comparative study", *International Journal of Current Research,* 8, (03), 27648-27650.

INTRODUCTION

Opposition of wound margins is required to promote wound healing and to produce a acceptable cosmetic result. Traditionally even in present era we are using suture and adhesive strips to oppose the wound margins but suturing of wound causes anxiety and pain to the patients by thinking about the needles and procedure. There are multiple choices for the wound closure such as sutures, staples, adhesive strips and adhesive glues and all these methods not only differ in their intrinsic properties but also in their application, required skill, amount of pain caused and duration of the procedure. Ideal method of wound closure should be painless easy, quick, and would not require a second visit for removal and closure must also produce sufficient tensile strength, have a low risk of infection and good cosmetic results. Suture cause tissue irritation, leading to an inflammatory response of low intensity and short duration and interfere in the process of tissue healing and difficulty of suturing in children leads to some professionals to use some adhesive material especially cyanoacrylates to oppose the wounds margins (Silveira *et al.,* 1998). Cyanoacrylate derivatives are one of the series of homologous compounds known as alkylcyanoacrylates. The adhesive property of cyanoacrylates is due to the fact that in monomer form the cyanoacrylates are liquids and upon contact With weak bases and water they quickly form a strong polymer bond and solidify. Initially, cyanoacrylates were marketed for commercial (nonpharmaceutical) purposes (eg, Krazy Glue). It was not until the 1970s that cyanoacrylates became available for clinical use in Canada, Europe, Israel, and the Far East (Quinn, 1998). The US Food and Drug Administration (FDA) first approved 2-octyl cyanoacrylate (DermaBond) for use in 1998(US Food and Drug Administration, August 26, 1998).Over the following years, other cyanoacrylates (Indermil and Histoacryl, both n-butyl-2 cyanoacrylates) garnered FDA approval for humans (US Food and Drug Administration, May 22, 2002, US Food and Drug Administration, February 16, 2007). Tissue adhesives are now widely used in both operative surgical closures as well as laceration repairs. In this study, the aim was to compare the efficacy of cyanoacrylate and suture material in closure of operative skin wounds in terms of (i) advantages or disadvantages of use of cyanoacrylates in comparison to sutures in closure of wounds and (ii) to compare the cosmetic result.

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MATERIAL AND METHODS

The study was conducted over a period of 1 year from September 2013 to September 2014. The study consisted of 100 patients who underwent elective surgical procedure and were grouped in two groups randomly. Group I consists of patients in which skin closure done by using cyanoacrylates and Group II consists of patients in which skin closure done by using interrupted nylon suture. Exclusion criteria for wounds

not suitable for skin glue are contaminated wounds, crushed or infected wounds, wounds which cross muco-cutaneous borders, high friction areas such as perineum, buttocks, high moisture areas. Others factors influencing wound healing like nutritional factor (anemia, vitamin deficiencies, malnutrition) and other chronic illnesses (jaundice, malignancy, uraemia) were not taken in account while evaluating the results.

Procedure of wound closure

In group I following steps taken

- After achieving absolute haemostasis the wound was cleaned with a solution of povidone iodine
- Subcutaneous interrupted sutures were applied in all cases with chromic catgut of 2-0 or 3-0 size.
- Oppose skin edges, usually by pulling slightly on both ends of the wound.
- Apply adhesive to the wound plus 5-10 mm either side .
- The wound was held together till it was dry to allow complete polymerization of the glue as was evident when the film of glue opacified.

In control group (group II), all wounds were closed using 2-0/3-0 nylon percutaneous interrupted sutures by the standard technique. Time was measured from start of skin closure till its completion. Clean and dry dressing was applied to the wound and removed after 2 day. Postoperative antibiotics were given according to the requirement of the case. The wound was examined on 2nd and 7th postoperative day for evidence of infection viz.erythema surrounding the edges of the wound, pain or serous and seropurulent discharge from the wound. Resultant scar, for assessment of cosmetic outcome, was seen at 2 weeks, 4weeks and 6 months.

RESULTS

A total of 100 patients were included in the study and designated as group I and matched with a similar control group designated as group II.The age range of the patients was between one year and 80years. In group I, of the total 50 patients, 30 were males and 20 females and in group II , of the total 50 patients ,28 were males and 22 females. Of the 50 patients whose wounds were closed with tissue adhesive (n-butyl 2-cyanoacrylate), results were found to be satisfactory. Compared to the suturing of skin, the glue was found to be easier and quicker to use. Distribution of cases as ahown in Table 1.

Table 1. Distribution of cases

Procedure	Number
Laproscopic Cholecystectomy	25
Open Appendectomy	15
Herniotomy	18
Inguinal Hernioplasty	22
Thyroidectomy	4
Open Cholecystectomy	16

The mean time taken in the closure of various wounds is shown in Table 2. After proper statistical analysis, the difference in the mean time taken in the closure of the wounds between group I and II was found to be significant. All wounds were inspected daily for any evidence of wound infection. This was assessed by the presence of any erythema, serous or serosanguinous or frankly purulent discharge from the wound.The incidence of wound dehiscence was also significantly lower in both groups. The incidence of dehiscence in group I was 4% (2 out of 50cases) and in group II was 2% (1/50).

Table 2. Time distribution of wound closure

Procedure	Length of Incision	T1 (seconds)	T2 (seconds)
Mc Burney incision	5-10 cm	27.43±3.15	197.5±21.3
Herniotomy	2-3 cm	9.11±1.44	24.22±2.04
Lap Cholecystectomy	5-10mm	8±1.88	17.91±3.04
Thyroidectomy	10-20cm	57.5±3.5	210±14.56
Open cholecystectomy	10-15cm	89±8.5	350±20.43

T1 - Mean time taken in skin closure in group I ± SD
T2 - Mean time taken in skin closure in group II ± SD

The cosmetic results achieved by closure with cyanoacrylate glue in group I were much better compared to conventional suture closure in group II. The scar seen at 15 and 30 days in the follow up visit of the patients was thin and supple. The patients were further followed for six months and the scars were cosmetically highly satisfactory at the end of this period. There was no cross hatching mark in group I. In group II there were gross cross hatching marks due to subtle inflammatory response hampering the cosmesis. Patient acceptance was noteworthy in case of closure with cyanoacrylate glue. They reacted favourably to having their wound closed by the non suture technique. Pain and discomfort at the site of incision at rest and while routine activity like walking, sitting and lying down was considerably less as judged by the verbal response of the patients. All patients were spared of the fear and pain of suture removal. No skin reaction to the glue was noted in any case.

Table 3. Incidence of wound infection

	No. of cases	Wound dehiscence	Percentage
Group I	50	2	4
Group II	50	1	2

DISCUSSION

Ardis in 1949 was the first person who synthesized Cyanoacrylates (Ardis AE, 1949). Coover (Coover *et al.,*1959) discovered the adhesive properties of cyanoacrylate adhesives and suggested their use as surgical adhesives .Cyanoacrylates are not indicated for closure of highly mobile areas such as joints; areas of friction, like feet and hands; and those areas where precise alignment is a priority, like eyelids and face. Its use is basically restricted to simple dilacerations in areas of low tension and easy access. Cyanoacrylate tissues adhesives is commonly used in all facial laceration and It is especially recommended for children, to avoid the fear of sutures and their removal afterwards. Cyanoacrylates adhesive takes significantly less time, had a lesser rate of infection and better cosmetic results with better acceptance by patients due to lesser pain and discomfort during routine activity in the postoperative period (Gupta *et al.,* 1999). In our study,

cyanoacrylate adhesive wound closure significantly take less time, lesser pain and less psychological trauma to the patient.

In our study no surgical site infection noted in the wound closed by the cyanoacrylate glue .Cyanoacrylate glue does not show any bacteriostatic and/or bactericidal effect in relation to *S. mutans, S. xylosis* and *P. aeruginosa,* which indicates the necessity of maintaining an antibiotic therapy in case of infection (Ueda *et al.,* 2004). There are varying reports regarding the antibacterial properties of cyanoacrylate glue. The glue has bacteriostatic effect against Gram positive bacteria while no activity has been reported against Gram negative bacteria (Jandinski *et al.,* 1971).There are no reports regarding the carcinogenic effect of cyanoacrylate glue till today. In our study it was observed that the time needed to close the surgical wound with the use of glue was significantly shorter as compared to wounds close by suture. The surgical wounds were evaluated second and seventh days after the surgical procedure to check for the presence of infection, wound dehiscence, or tissue reaction to a foreign body. The wounds closed with suture showed an aspect of intense inflammatory process and erythematous areas around the incision, whereas the incisions closed with the adhesive showed no tissue reaction. Both groups did not show dehiscence, hematoma, or presence of infection. The cosmetic results are much better in that the scar is thin and there is no cross hatching.

Conclusion

Skin glues are a safe and effective method to close selected wounds It is applicable in the wounds which are clean, in less mobile area ,and and have skin edges that are not under tension. .It is very useful in case of lacerated wound over the faces for better cosmetic result and paediatric age group in emergency department. Cyanoacrylate glue had better cosmetic result as compared to the suture. However, the method is not recommended for closure of moist surfaces.

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