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Economic aspect of tissue glue in thyroid surgeries

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ABSTRACT

Background: Tissue glue or adhesives are the recent advances in closure of the skin wound. They have been used as an alternative to the sutures, staples and plasters. They have been found to be cosmetically better compared to other modes of wound closure. Whether the tissue glues are economically feasible for routine use has to be found out. The aims and objectives of this study is to find out the cost-effectiveness of tissue glue in comparison with traditional suture technique in thyroid surgeries.
Methods: This is a prospective study to find out the economic aspect of tissue glue in comparison with silk suture in fifty three patients who underwent thyroidectomy at Kasturba Medical College, Manipal.
Results: The overall cost for tissue glue procedure was significantly less when compared to silk suture technique.
Conclusions: Iso amyl-2-cyanoacrylate is excellent tissue glue. Though the initial cost of tissue glue is higher compared to silk sutures, the overall cost including the anaesthetic cost, hospital stay and reviews is considerably less. Thus we conclude that the tissue glue is economically cheaper compared to suture methods.

Keywords: Tissue glue, Wound healing, Silk sutures, Iso amyl-2-cyanoacrylate

INTRODUCTION

Modern methods of wound closure include staplers, tapes and tissue adhesives. Since the ancient times there has been a gradual improvement in the knowledge of wound healing.[1] People had learnt that the wound heals best when its edges are closely approximated along with the maintenance of asepsis.[2] The initial use of plant fiber, hair, tendons and wool threads were later replaced by sutures.[1] Soon different types of sutures like naturally occurring, synthetic, absorbable and non-absorbable sutures were developed.[3] As suturing of the wound took more time and skill, mechanical suturing instruments (staplers) were developed in the early decades of 20th century.[4,5]

With the progress in the knowledge of closing the wound, surgeons gradually shifted their concentration on the cosmetic outcomes of the wound healing. The discovery of tissue glue obviated the need for sutures. Coover discovered the inherent adhesive properties of cyanoacrylates, which are synthetic substances and used them in surgery in the mid-20th century.[6,7] Since then extensive descriptive and comparative studies have been conducted to confirm their role as a favourable option in closing superficial wounds.[8-13] Different cyanoacrylate compounds have been synthesised which are unique in their clinical properties. The cyanoacrylates have been found to be safe for clinical use with no reports of adverse effects or carcinogenicity.[14,15] In this study we have tried to find out the cost effectiveness of the tissue glue in comparison with the sutures.

METHODS

Study design

This is a prospective study of patients who underwent thyroidectomy and skin closure either by traditional suture technique or Iso amyl-2-cyanoacrylate.

Study site and source

Patients who underwent thyroidectomy from August 2011 to November 2012 under the Department of ENT, Kasturba Medical College, Manipal, Karnataka.

Sample size

28 tissue glue and 25 sutures.

Lavene's inferential statistics test was used to find out the equality of variances.

Subject selection criteria

Inclusion criteria

Inclusion criteria were patients with Thyroid swelling who will undergo thyroidectomy; both males and females; Hb%, RFT, TFT and Blood sugars should be within normal limits; Age range between 20 and 50 years.

Exclusion criteria

Exclusion criteria were history of previous neck surgeries; subject having any co-morbid conditions like Diabetes, Tuberculosis, Chronic granulomatous diseases and Skin diseases; deranged biochemical and haematological tests; patient not willing for study and those who will not turn up for follow-up.

Procedure

The patients who were admitted for thyroid surgery, willing to participate in the study, fulfilling inclusion and exclusion criteria were investigated for complete blood picture, thyroid function test, renal function test and blood sugar. After confirming the normalcy of the tests, patients were taken up for surgery and wound closure was done either with silk suture or tissue glue (Iso amyl-2-cyanoacrylate). Tissue glue was applied after closing the platysma and approximating the skin with the forceps. Glue was applied in multiple layers over the skin edges and care was taken to avoid its seepage into the subcutaneous tissue. Intra-operatively the time taken for the wound closure either with suture or glue was recorded from the start of suturing the platysma till the end of completion. Standard anaesthesia was used in all cases. The cost of anaesthesia for the duration of wound closure was calculated from the total anaesthesia cost of surgery. Tissue reaction if any and the duration of hospital stay were recorded post operatively.

RESULTS

Of the 53 patients in the study 28 were included in tissue glue group and 25 in silk suture group. Among the 28 patients in tissue group 4 were males and 24 were females. Among the suture group 21 were females and 4 were males (Figure 1). The age ranged from 20 years to 50 years in both the group (Figure 2).

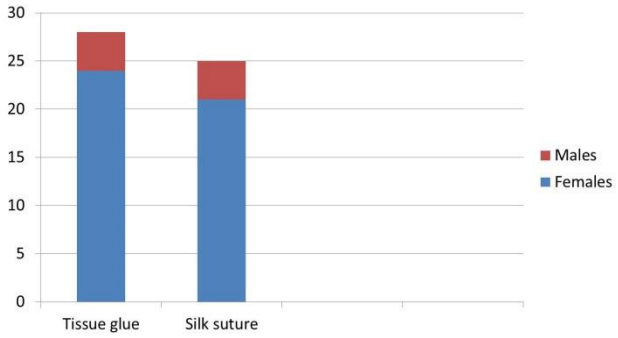

Figure 1: Distribution of males and females in each group.

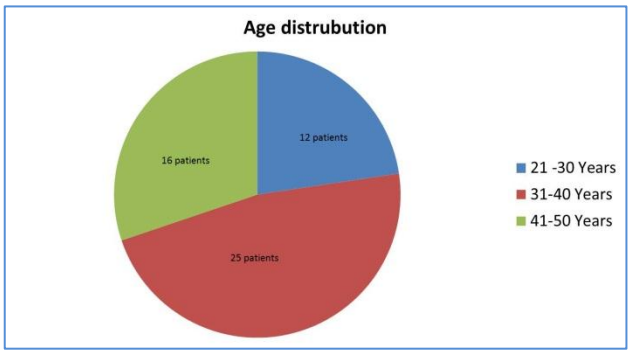

Figure 2: Age distribution of patients.

The mean hospital stay for the patients with tissue glue was about 3.6 days as compared to 5.3 days for suture group. The patients who underwent wound closure with tissue glue were discharged after removal of the vacuum drains, which ranged between 2 to 4 days, depending on the collection in the drains (removed if collection is <10 ml) and were called for review after 2 weeks for biopsy report and to assess the scar for any complication. On the other hand patients who underwent wound closure with silk sutures stayed usually for 6 days till the sutures were removed and then discharged. They were also called at 2 weeks.

The duration of procedure was calculated from the start of the platysmal sutures upto the end of skin suture or application of tissue glue. In cases where it was planned to apply tissue glue, the surgeon tends to be more careful in putting platysmal suture and usually puts one or two extra subcutaneous suture to approximate the skin edges closely. Thus the duration of procedure was taken from the start of platysmal suture till the end, otherwise the

duration for applying just the tissue glue usually takes about 15-30 seconds. We found that the average duration of the procedure for tissue glue technique was about 20 minutes as compared to 30 minutes for silk sutures. The duration for tissue glue ranged from 16 minutes to 29 minutes and for silk sutures from 16 minutes to 37 minutes respectively depending on the surgeon/resident doing the procedure. The duration was also dependent on the length of the wound, which ranged from 6 to 10 cms, averaging about 8 cms.

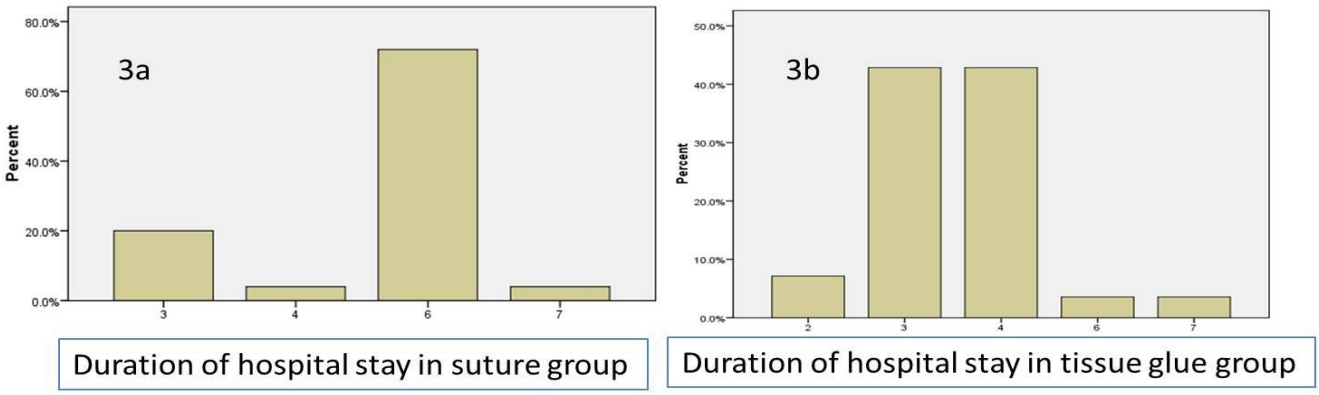

Figure 3 (a, b): Duration of hospital stay in each group.

Coming to the cost for each technique, we took the anaesthetic cost for the duration of technique, cost of tissue glue or silk suture and cost for hospital stay. The anaesthetic cost was calculated only for the duration of the procedure.

Anesthetic cost= Duration of procedure (mins)/Total duration of surgery×Total anesthetic cost.

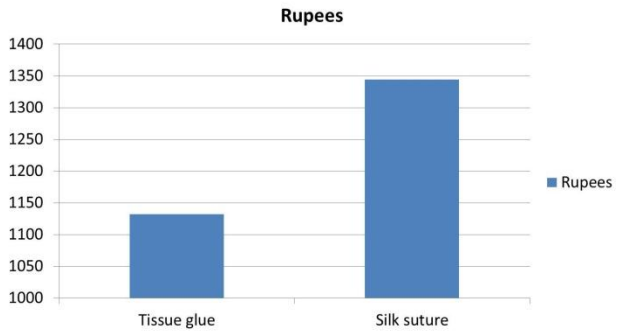

Figure 4: Average cost for each technique.

The average anaesthetic cost for the duration of tissue glue procedure was calculated to be Rs. 267/- compared to suture technique which costed Rs. 399/-. The brand of Iso amyl-2-cyanoacrylate used costed Rs. 325 per ampoule of 0.25 ml, which could be used for a wound of 15 cms. It costed Rs.150 per pack of silk suture. The cost of hospital stay was Rs.150 per day in general ward. Thus

Cost of technique= Anaesthetic cost + cost of glue/suture + cost for hospital stay (No. of days of stay × 150).

The cost of tissue glue technique was found out to be Rs.1132 as compared to Rs. 1344/- for suture technique, which is 18% higher than the tissue glue technique (Figure 4). Though the initial cost of tissue glue is higher than suture, the overall cost reduces due to early discharge and faster technique.

DISCUSSION

Surgical wound closure has progressed from a necessary part of surgery to a cosmetic need. People undergoing surgery are more worried about the scar that appears after the surgery than the actual outcome of the surgery. Thus the medical science has evolved from primitive wound closure to more modern ways of wound closure which is both cosmetically and economically superior. There have been a different ways of wound closure ranging from sutures, staplers, tapes, zips and tissue glues. All these methods have advantages and disadvantages of their own.

In this study we wanted to compare the economic outcomes of the two different ways of wound closure. The economic aspect of individual technique depends on the anesthetic cost for that duration of the procedure, cost of the material and hospitalization cost for individual technique.

In a study done by Matthews et al, who compared fibrin tissue glue with sutures the average hospital stay for tissue glue patients was 2.8 days compared to 3.7 days with suture.[16] They also claim that the drainage was less with fibrin tissue glue which helped the early discharge of patients. In our study the mean hospital stay for the patients with tissue glue was about 3.6 days as compared to 5.3 days for suture group. As most of our patients are from far-off places they find it cumbersome and expensive to go home on post-operative day 3 or 4 and again come back on 6th day for suture removal. Even otherwise for patients who stayed nearby and willing to come for suture removal had to take the burden of extra

hospital visit. Thus the patients who underwent tissue glue technique had an advantage of getting discharged early and also reduced hospitalisation cost. Some of the patients who underwent suture technique were also anxious about suture removal, which was an advantage for tissue glue patients.

In a study by Jennifer et al, the adhesive skin closure was on an average took 29.7 sec compared to 289 sec for subcuticular sutures.[17] Ridgway et al reported that the tissue glue procedure took longer time compared to staples with a mean difference of 67±42 secs to 91 secs, which was significant.[18] Reduced procedure time reduces the cost of anaesthesia.

Thus, even though the cost of tissue glue is higher than the silk sutures, the reduced anaesthetic and hospitalisation cost brings down the overall cost for tissue glue procedure. A similar view is given in a study by Mohamed et al.[19]

CONCLUSION

Tissue glue for wound closure is an excellent choice. It reduces the burden on patients in terms of duration of procedure, anesthetic cost and number days of hospitalization. The cosmetic outcome is comparable with other standard methods of wound closure and patient satisfaction is higher compared to other methods. Given a chance, patients would prefer tissue glue for wound closure and may demand for it in future.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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