

# AUDIT ON SUTURE TYPES USED FOR NECK DISSECTION WOUND CLOSURE IN ORAL SQUAMOUS CELL CARCINOMA PATIENTS

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## ABSTRACT

A suture is a device, either natural or synthetic, which is used for ligation of blood vessels and in wound closure following surgery. Its major functions are to hold tissues together following wound closure or surgery. Neck dissection procedures leave open wounds which need to be approximated for the process of wound healing and aesthetic considerations. Henceforth the aim of the current study is to assess the type of sutures used in surgical wound closure of neck in patients with oral squamous cell carcinoma following radial neck dissection in private institutional setup in Chennai. Data was procured from the case sheets of patients undergoing radial neck dissection following surgical management of oral squamous cell carcinoma. The data was tabulated in MS-Excel and analysed by SPSS software (Version 20). The results were inferred. 60% of the external surgical wound closure were sutured using silk sutures while 40% were sutured using polyglactin and nylon sutures. 60% of the internal wound closures were closed using polyglactin while 40% was using polypropylene and nylon. Polyglactin 910 and silk were the most predominantly used suture materials for internal and external surgical wound closure in an private institutional set up in Chennai.

**KEYWORDS:** Neck dissection, Nylon, Oral squamous cell carcinoma, Polypropylene Silk, Vicryl, Sutures.

## INTRODUCTION

A suture is a device, either natural or synthetic, which is used for ligation of blood vessels and in wound closure following surgery (Chu, von Fraunhofer and Greisler, 2018; Rao and Santhosh Kumar, 2018). Its major functions are to hold tissues together following wound closure or surgery. It is the gold standard method for mechanical wound closure. The goals of the suture includes obliteration of the dead space, and even distribution of tension along the deep lines. Though there are various methods for wound closure such as staples, tapes, adhesives and sutures among which suture still serves to be the standard devices used (Clamon, 1994)-(Patil *et al.*, 2017; Abhinav *et al.*, 2019). Suture has recently developed in the last two decades and created a huge market for biomaterials (Singhal, Singh and Ray, 1988; Moy, Waldman and Hein, 1992; Alan Barber, Boothby and Richards, 2006; Christabel *et al.*, 2016). Head and neck carcinoma rank as the 6th most common carcinoma in the world (R. and Shaha, 1985; Spiro *et al.*, 1986)-(Patturaja and Pradeep, 2016; Marimuthu *et al.*, 2018). It is estimated that more than 60% of

the patients present with early lesions without nodal involvement while 30% (Byers, Wolf and Ballantyne, 1988; Kowalski *et al.*, 1993) present with metastatic carcinoma. This finding is very crucial as the presence of cervical node metastasis increases the chances of mortality by 50% (Shah and Andersen, 1995). Neck dissections are valuable procedures for treating metastatic carcinoma of head and neck. Crile (Crile, 1987) in 1906 and Martin (Martin *et al.*, 1952) *et al* in 1952 popularised and gave the description of radial neck dissection (RND). The increased morbidity rate of the RND procedure later gave rise to modified RND procedure which decreases the mortality rate by preserving the vital structure.

These RND procedures leave open wounds which need to be approximated for the process of wound healing and aesthetic considerations. therefore effective wound healing is important for successful surgical wound closure, the failure of which leads to infections and scarring (Goel, 2016; Kumar and Sneha, 2016; Kumar, 2017a, 2017b, 2017c; Kumar and Rahman, 2017; Abhinav, Sweta and Ramesh, 2019; Jain *et al.*, 2019).

The decision of choice of the material used for the wound closure highly depends on various factors which includes anatomical location, length of the wound and the age of the patient (Hollander and Singer, 1999). It also depends on the surgeons personnel preference and experience in handling suture materials (Tajirian and Goldberg, 2010) (Packiri, Gurunathan and Selvarasu, 2017).

Henceforth this study aims to audit the type of sutures used for surgical wound closure following neck dissections in patients undergoing surgical management of oral squamous cell carcinoma in a private institution in Chennai.

## **MATERIALS AND METHODS**

This study was performed in Private Dental College and Hospitals among the patients undergoing surgical management of oral squamous cell carcinoma and requiring neck dissection over the period of 10 months between June 2019- March 2020. Case sheets of 84000 patients were assessed among which 47 patients who had undergone carcinoma surgery were identified. Among the 47 samples only 13 samples which satisfied the inclusion criteria, were included in the study. The sample size of the current study was 13. Information on the procedures and materials used are assessed from the surgical records of patients undergoing neck dissection for surgical management of oral squamous cell carcinoma. Incomplete data without photographs and procedural notes were excluded from the study.

Convenient sampling was done to reduce the sampling bias. The verification of the information on the case sheets was done in the presence of two reviewers to reduce the observer's bias. The data was verified with the help of photographs and procedural notes documented. The data obtained was tabulated in MS-Excel with various parameters which includes age, gender, type of suture material used and the number of sutures used. The data was transferred to the host computer and analysed using IBM SPSS software (version 20) and the results were tabulated and interpreted.

## **RESULTS AND DISCUSSION**

Patients of mean age of 51 years with a range of 33-76 years participated in the study. For internal suturing, Polyglactin 910 (vicryl) was the most commonly used suture (63.64%), followed by silk used in 18.18% and polypropylene used in 9.09% of the total number of cases and nylon was used in

9.09% of cases, implication that nylon and polypropylene was the least used sutures for internal wound closure (Figure1) .

For external suturing, silk sutures were commonly used in 63.64% among the total number of cases ,polyglactin 910 were used in 27.27% of the cases while nylon was used in 9.09% of the total number of cases.(Figure 2).There was no association between the type of sutures used for external wound closure and gender of the patient , where p value was 0.190( $p>0.05$ )(Figure 3)

In our current study, 63%of the external suturing were done using silk sutures while 37% were done using polyglactin 910 and nylon suture material. 63% of the internal surgical wound closure were done using polyglactin 910 (Vicryl) while 37% were done using silk and nylon.

According to our current study, Silk and polyglactin suture materials were the most abundantly used suture materials for surgical wound closure of the neck in patients undergoing radial neck dissection.

Silk suture material is a natural multifilament and a non-resorbable suture material. It is naturally obtained from the domesticated species *bombyx mori*. Silk has an excellent strength and handling property, as it is coated with beeswax for smooth passage(Kaplan *et al.*, 1993, 2000). There have been no tissue reactions documented with silk sutures. Since it's both economical and has a better handling property , it's being preferred by surgeons. Ghosh A et al is in agreement with silk being a superior suturing material than surgical staples(Ghosh *et al.*, 2015). Our current study is in agreement with the previous studies where silk is considered a good choice of material for external wound closure.

Polyglactin or polyglactic acid is a copolymer of lactinate and glycolic coated with a synthetic lubricant. Vicryl suture retains 75%(Hochberg, Meyer and Marion, 2009) of its tensile strength at 2 weeks and 40% at three weeks while complete resorption takes place in 60 days(Conn *et al.*, 1974). Gaziloda et al(Gazivoda, Pelemiš and Vujašković, 2015) conducted a study on comparison of different suture materials including vicryl plus, catgut and flexon where vicryl showed the mildest tissue reaction, while vicryl Rapidae contributed to faster wound healing and lower dehiscence. Our study revealed that vicryl (polyglactin) was the most commonly used suture material for wound closure in oral surgery(Jesudasan, Abdul Wahab and Muthu Sekhar, 2015), which is in agreement with Joseph et al(Parell, Joseph Parell and Becker, 2003) who had proposed studies on plastic surgeries. Our current study is also in agreement with the study done by noriaki yamamoto et al(Yamamoto, Noriaki & Takahashi, Yoshihiro & Kono, Tatsuyuki & Abe, Ayaka & Kawamura, Kazuhiro & Joujima, Takaaki & Wakasugi-Sato, Nao & Nishimura, Shun & Oda, Masafumi & Tanaka, Tatsurou & Kito, Shinji & Kawano, Kenji & Morimoto, Yasuhiro, 2017) who discovered reduced infections with vicryl.

Nylon was the first synthetic suture material introduced. It is composed of long chain polymers of nylon-6 while it is available as monofilament and braided form. The monofilament form is named ethilon and it's the most widely used non-resorbable suture material according to moy RL(Moy, Waldman and Hein, 1992).The results of the previous study is not in favour our present study where nylon was the least used suture material. This is unfortunately due to the significant memory and difficulty in manipulation of the suture material making it difficult to work with in the operating table(Bloom and Goldberg, 2007).

Polypropylene is a monofilament suture that was formed by catalytic polymerisation of polypropene. This suture was used for external suturing in our current study which is also in agreement with the previous studies(Tajirian and Goldberg, 2010).

The limitations of our current study includes geographically isolated sample collection, availability of limited samples and short term analysis. The future scope of the current study was to assess the type of sutures used for wound closure in a larger population and mechanically analysed the sutures and its associated complications postoperatively.

## CONCLUSION

Within the limitations of our current study it can be concluded that Polyglactin 910 and silk were the most predominantly used suture materials for internal and external surgical wound closure in patients undergoing radial neck dissection for surgical management of oral squamous cell carcinoma in a private institutional set up in Chennai.

## AUTHOR CONTRIBUTIONS

Jembulingam Sabarathinam performed the analysis, interpretation and wrote the manuscript. Dr.Kathiravan Selvarasu contributed to conception, data design, analysis, interpretation and critically revised the manuscript. Madhulaxmi M helped in coordinating the research and was one of the reviewers. All the authors have discussed the results and contributed to the final manuscript.

## CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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surgical sutures for the prevention of stitch abscess after surgery in patients with oral squamous cell carcinoma', *Medicina oral, patologia oral y cirugia bucal*, 22.

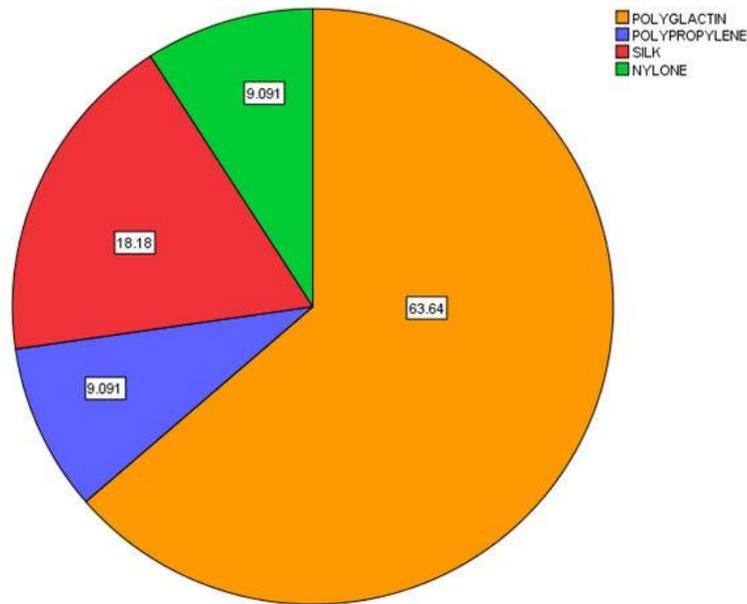


Figure 1: Pie chart represents the type of sutures used for internal wound closure following radial neck dissection; Polyglactin 910 (Orange colour-63.64%) was the most commonly used suture for internal wound closure following radial neck dissection in comparison to silk (Red-18.18%), Nylon (Green-9.09%) and polypropylene (Blue-9.09%).

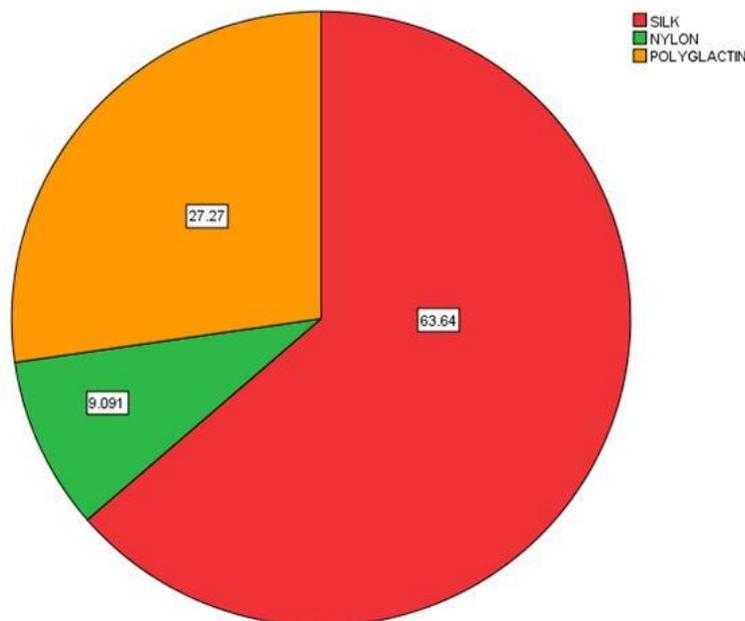


Figure 2: Pie chart represents type of sutures used for external wound closure following radial neck dissection; Silk (Red-63.64%) was the most commonly used suture material for external wound closure following radial neck dissection when compared to nylon (Green-9.09%) and polyglactin (orange-27.27%).

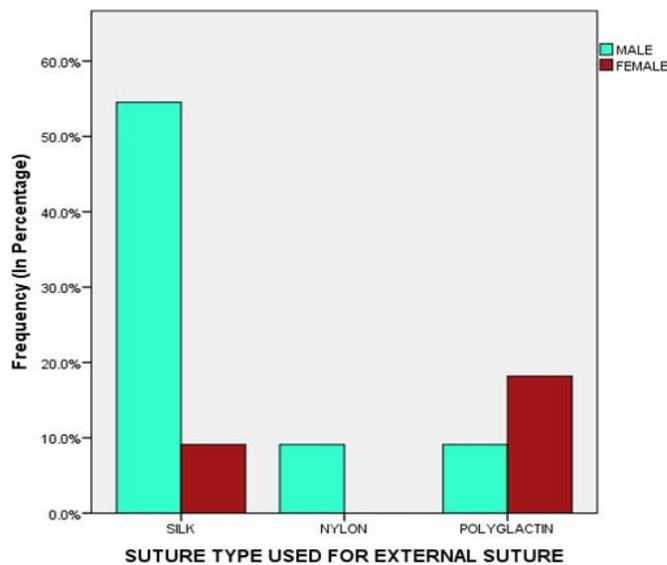


Figure 3: Bar graph depicts the association between the type of suture used for external wound closure among males (Cyan colour) and females (Brown colour) following surgical management of oral squamous cell carcinoma; X axis shows the type of sutures used for external wound closure among males and females and Y axis shows the number of patients in each category. Silk was used in 55% and 9% of females, Nylon was used in 9% of males and 0% in females, Polyglactin was used in 9% of males and 18% of females. Chi square test was done and association was found to be statistically not significant ; Pearson's value:3.317, DF:2, p value:0.190(>0.05). There is found to be no significant association between the type of external sutures used among males and females. This variation could be due to the unequal distribution of cases.