



Efficacy of L-Ascorbic acid in the healing of extraction site after trans alveolar extraction of third molar teeth

Subhashini Ramasubbu*, Shivangi Gaur, Abdul Wahab P U, Madhulaxmi Marimuthu

Department of Oral and Maxillofacial Surgery, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai-600 077, Tamil Nadu, India

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ABSTRACT

Wound healing monitoring after every surgery is the most vital concern to deal with. The surgical removal of the teeth involves guttering of overlying bone, splitting the tooth (odontectomy), delivery of the tooth, irrigation of the socket, achieving haemostasis and closure of the soft tissue flap. This leads to big surgical insults resulting in post-operative inflammatory response like pain and swelling, difficulty in mouth opening, fever, etc. In some cases, other rare complications, including infection, nerve damage, have also been reported. The objective of this study is to evaluate the effects of submucosal injection of vitamin c (L-Ascorbic Acid) in wound healing after trans alveolar extraction of teeth. Thirty patients requiring trans alveolar extraction of teeth were included in this study. Patients were divided into two groups, Group S (Vit c) and Group B (Control). Healing of extraction socket was observed on 3rd and 7th post-operative days. The study group (Vitamin C) had better healing indices than the controls at 7th post-op day. There was no significant difference in 3rd post-op day. There was no significant reduction in pain on 3rd and 7th post-operative days. L-Ascorbic acid injection provides satisfactory post-operative healing following trans alveolar extraction of teeth. But it does not decrease the post-operative pain following surgery.



*Corresponding Author

Name: Subhashini Ramasubbu

Phone: 9999286618

Email: meetsubha07@gmail.com

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INTRODUCTION

Wound healing monitoring after every surgery is the most vital concern to deal with. The surgical removal of the teeth involves guttering of overlying bone, splitting the tooth (odontectomy), delivery of the tooth, irrigation of the socket, achieving haemostasis and closure of the soft tissue

flap (Farina and Trombelli, 2011). This leads to big surgical insults resulting in post-operative inflammatory response like pain and swelling, difficulty in mouth opening, fever, etc. In some cases, other rare complications, including infection, nerve damage, have also been reported. In addition to this, the residual bony defect takes several weeks to months even a year to slowly fill with blood and gradually with bone and to reossify (Choukroun et al., 2006).

Vitamin C involves many physiologic functions in the human body, and it has an important role in collagen formation (Lis and Baar, 2019). Because of its role in collagen formation, it helps in wound healing (Pullar and Vissers, 2020). Ascorbic acid is a cofactor in the hydroxylation of proline and lysine, which is a necessary step in collagen formation (Peterkofsky, 1972). The objective of this study is to evaluate the submucosal injection of vitamin C (L-Ascorbic acid) in wound healing of extraction site after trans alveolar extraction of teeth.

Aim

To evaluate the clinical efficacy of Vitamin C injection in soft tissue healing following trans alveolar extractions of teeth.

Objective

To evaluate the soft tissue wound healing at the extraction site on 3rd and 7th post-operative day.

To compare post-operative pain using a standard scale.

MATERIALS AND METHODS

The study was conducted in 30 patients who were reported to the Oral Surgery clinic for the trans alveolar extraction of teeth. The patients were randomly allocated into two groups. Group S, who received intra mucosal Vitamin injection 200mg and control group Group C received placebo. Trans alveolar surgical extraction of teeth was carried out in all patients. Patients in Group S were given an intramucosal injection of Vitamin C (L-ascorbic acid) 200mg after the closure of the mucoperiosteal flap. Healing is measured by Landry *et al.* (1988) (Figure 1) on 3rd and 7th post-operative day.

RESULTS

The healing was measured by Landry *et al.* index. Table 1 represents the mean index of the study group on 3rd and 7th post-operative day was 2.86 and 4.93, respectively. The mean index of the control group on group 3rd and 7th post-operative day was 2.30 and 3.03 respectively Study group had satisfactory healing indices than the controls on the 7th post-op day. There was no satisfactory difference on 3rd post-op day. There was no significant difference in accordance with pain between the groups. A VAS scale measured the pain.

DISCUSSION

Vitamin C involves many physiologic functions in the human body, and it has an important role in collagen formation (Carr and Lykkesfeldt, 2018). Because of its role in collagen formation, it helps in wound healing. Ascorbic acid is a cofactor in the hydroxylation of proline and lysine, which is a necessary step in collagen formation. To stabilise the triple helix structure of collagen, hydroxyproline and hydroxylysine is needed (Nusgens *et al.*, 2001). In the absence of this stabilisation, the structure disintegrates (Nusgens *et al.*, 2001). Vitamin C or Ascorbic acid provides tensile strength to the newly formed collagen, which is essential for stretching without

tearing. For ulcer healing tensile strength is important. If it fails to stretch the healed ulcer may face a future breakdown. For the functioning of a proper immune system, this Vitamin C is important especially in the patients with open wounds (Blomhoff, 1994; Yue and Rao, 2020).

Vitamin C has Other essential functions also which include:

1. First, it is an antioxidant. It inhibits damage to body cells
2. It is an anti-inflammatory agent which helps in reducing post-operative inflammatory sequelae
3. Carnitine which is essential for the transport of fat to mitochondria is synthesised with the help of Vitamin C
4. It also plays a vital role in the synthesis of Norepinephrine, a neurotransmitter
5. It inhibits the oxidation of iron in the intestine and promotes the absorption of iron.
6. It also inhibits the oxidation of Vitamin E in the blood.

In spontaneous healing after an extraction, the socket is immediately filled by the blood, which is usually completely replaced gradually by increasing granulation tissue density within 2-7 days. Epithelialization starts within 24 hours, and it gets completed after 1-4 weeks (Amler, 1969, 1999).

In this study, Vitamin C was injected submucosally of the teeth to be extracted. The total numerical index was evaluated, resulting in an average value per each patient. This analysis indicates a 100% reduction in gingival inflammation from the average baseline value over a week to one month. The evaluated per cent indicated a significant reduction in the gingival inflammation to the surgical site. It is mandatory to handle soft tissues, especially the thinner ones, more carefully to avoid necrosis. Improvement of the tissue colour and consistency was carefully observed in the recall visits on 3rd and 7th POD.

Other significant changes which were observed after Vitamin-C (L-Ascorbic acid) administration were in accordance with Nusgens *et al.* (Lang and Lindhe, 2015; Farina and Trombelli, 2011). An elevated number of fibroblasts was detected, forming more collagen fibres which could be seen clinically. Many newly formed minute blood capillaries were also detected clinically. These changes are consistent in the formation of new connective tissue in a healing wound.

Healing index score	Clinical findings
Very poor	Tissue color: $\geq 50\%$ of gingiva red Response to palpation: Bleeding Granulation tissue: Present Incision margin: Not epithelialized, with loss of epithelium beyond incision margin Suppuration: Present
Poor	Tissue color: $\geq 50\%$ of gingiva red Response to palpation: Bleeding Granulation tissue: Present Incision margin: Not epithelialized, with connective tissue exposed
Good	Tissue colour: $\geq 25\%$ and $<50\%$ of gingiva red Response to palpation: No bleeding Granulation tissue: None Incision margin: No connective tissue exposed
Very good	Tissue colour: $<25\%$ of gingiva red Response to palpation: No bleeding Granulation tissue: None Incision margin: No connective tissue exposed
Excellent	Tissue color: All tissues pink Response to palpation: No bleeding Granulation tissue: None Incision margin: No connective tissue exposed

Figure 1: Healing index Score

Table 1: Mean healing index

Groups	3 rd Post-Operative Day	7 th Post-Operative Day
Group S	2.86	4.93
Group C	2.30	3.03

This is because Vitamin C plays a vital role as a cofactor for collagen formation. It is the main component of the connective tissue that forms the framework around which the new tissue is built. Collagen is an essential component in the wall of blood vessels. That is why, despite the increase in the number of blood vessels, redness and bleeding tendency markedly decreased clinically. These vessels provide more nutritional and enough oxygen supply to chronically irritated, damaged mucosal areas, thereby it improves their healing.

CONCLUSION

Submucosal Vitamin C improves post-operative wound healing following Transalveolar extraction of teeth. But it does not decrease the post-operative pain or swelling associated with the surgery.

Conflict of Interest

The authors declare that there is no conflict of interest for this study.

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