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Original Research Article

Comparison of Advantages and Disadvantages of Electrosurgery Techniques and the use of Scalpel in Intraoral Incisions of Patients under General Anesthesia

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ABSTRACT

Introduction: Due to the discrepancy between the results of previous studies and the lack of such a study in intraoral incisions, this study was performed to compare the advantages and disadvantages of electrosurgery techniques and the use of scalpel in intraoral incisions in patients under general anesthesia. **Material and Methods:** This is a cross-sectional descriptive study that was conducted in 2019 in Imam Reza Hospital (Tabriz University of Medical Sciences) with the participation of 40 patients (20 surgical patients with razors and 20 patients with electric catheters) candidates for oral surgery. The results of surgery were compared in two groups of patients. **Results:** There was no difference in wound dehiscence in each group after surgery. Both in the razor cutting group and in the electrocautery group; Only one case of wound dehiscence was observed, which in both cases resolved without special surgical or pharmacological intervention and only with regular washing. **Conclusion:** The present study showed that the scar tissue created by electrosurgery was significantly more than the scalpel technique, which can be attributed to the induced heat damage to adjacent tissues. The results of the present study showed that the use of a cutter compared to a scalpel significantly reduces the incision time.

Keywords: Electrosurgery, Intraoral Incisions, Disadvantages

Introduction

Orthognathic surgery is one of the common methods for treating patients who mainly suffer from dental-facial deformities and its adverse effects on beauty [1-3]. Dental-pink deformities are seen in about 20% of the population [4]. These people have some degree of functional and aesthetic side effects. These problems can be limited to one jaw or involve the craniofacial structure. It can be one-sided or two-sided, or along a transverse, horizontal, or vertical plane. Jaw surgery is mainly performed to correct functional problems in the facial organs and can improve the ability to chew food, talk, breathe and in some cases gingival smile. Due to the high prevalence of dental-facial deformities and adverse effects on appearance and the level of self-confidence of people should be looking for a way to improve the quality of this type of surgery and reduce its complications [5-7]. Two common methods for this type of surgery are the use of electrosurgery and the traditional method of using a scapula to make an incision, each of which has advantages and disadvantages [8-10]. Dean and colleagues conducted a study to evaluate the safety and efficacy of harmonic scalpel (ultrasonic surgery) compared to the technique of electrocautery and showed that the rate of postoperative complications was the same in both techniques; But flap removal time is reduced by using a harmonic scalpel, and Spinelli and colleagues compared piezosurgery and conventional winning devices in orthognathic surgery. This study was performed on twelve patients and resulted in a 25% reduction in bleeding, a 35% increase in the duration of the surgical procedure, a reduction in the incidence of hematoma and swelling after surgery, and a significant reduction in postoperative neurological disorders [11-13]. A systematic review study comparing skin incisions from vasculpel electrocautery after reviewing 1234 articles concluded that there was no significant difference between the two techniques in terms of wound infection rate but incision time, postoperative pain and patient bleeding by electrocautery [14-16]. Due to the discrepancy between the results of previous studies and the lack of such a study in intraoral incisions, this study was performed to compare the advantages and disadvantages of electrosurgery techniques and the use of scalpel in intraoral incisions in patients under general anesthesia.

Material and Methods

The present study was approved by the Ethics Committee of Tabriz University of Medical Sciences. In this study, 20 patients who met the inclusion criteria including having structural problems of the jaw and face, and the need for oral surgery, no previous history of oral surgery, no history of facial reconstruction surgery, no history of trauma to the face and jaw, no addiction to tobacco or drugs, no immunodeficiency diseases (acquired immunodeficiency syndrome, uncontrolled diabetes, etc.) and no coagulation disorders were selected. Among these patients, patients who did not want to attend regular follow-up sessions were excluded from the study. In this plan, the amount of scar, incision time and the incidence of electrosurgery and scalpel were measured. After the final decision to treat malocclusion, patients underwent orthognathic surgery in the hospital. After the usual procedure, the patient underwent general anesthesia and intraoral incisions were made. For each participant in this study, both techniques were used by split-mouth method, such as to perform Lefort 1 mucosal incision on one side of the maxilla by electrosurgery (Force Ez Electrosurgical Unit in cut mode and power 100 watts) and On the other side, symmetrical incisions were made in the usual way with scalpel number 15. The incisions were sutured at the end of the surgery with a 4-zero vicryl thread. The same time was taken to make the cut as well as to sew on both sides. The evaluation of the function of these two devices was performed by examining the criteria and parameters during and after surgery. Among the problems during surgery, time spent (incision rate in seconds) was measured using a timer by one of the operating room staff and at the surgeon's notice. Complications after surgery were measured by follow-up appointments of person B (maxillofacial surgeon) who was unaware of the device used to make the incision on either side of the jaw. The first follow-up was one week after surgery. The amount of scar, which is a complication of intraoral incisions, was measured using a gauge based on millimeters. Cases where the suture was ruptured were reported as dehiscence by person B (maxillofacial surgeon). Update reported. At the next follow-up appointment, which took place six weeks after surgery, in the same way, postoperative complications were measured and recorded by person B. Finally, the recorded information obtained from the consequences of these two methods were compared with each other. Appropriate graphs and statistical tables were used to describe the data and Shapiro-Wilk, Wickackson and Mann-Whitney tests were used to analyze the data. This study was registered in

the ethics committee of Tabriz University of Medical Sciences. The samples participating in this study completed the informed consent form and then entered the study.

Results

In this study, according to Shapiro-Wilk test, it was found that the data related to the time of incision and the amount of scar tissue were abnormal for the scalpel method. The maximum surgery time for the electric catheter method was 9 seconds and the minimum surgery time for this method was 5 seconds. While these values were 14 and 8 seconds for the razor blade method, respectively. The mean, mean and standard deviation of cutting time in the razor blade method were higher than the electric cutter. Mann-Whitney test was used to compare the incision time in the two methods and it was found that the surgical time in the electric incision method was significantly shorter than the blade blade method ($p < 0.001$). The highest amount of scar tissue for the electric cutter method was 2.5 and the lowest amount of scar tissue for this method was 1. Also, these values were equal to 2 and 1 for the Bistouri razor method, respectively. The median, mean and standard deviation of scar tissue in the electric catheter method was higher than the bistor razor method. To compare scar tissue in the two studied methods, Mann-Whitney test was used and it was found that the amount of scar tissue in the electrocautery method was significantly higher than the razor blade method. ($p = 0.028$). There was no difference in wound dehiscence in each group after surgery. Both in the razor cutting group and in the electrocautery group; Only one case of wound dehiscence was observed, which in both cases resolved without special surgical or pharmacological intervention and only with regular washing.

Discussion

Electrosurgery was first performed in 1926. Although most surgeons still tend to use scalpels to make incisions, electrosurgery is an integral and evolving part of surgery [17-19]. Several studies compared the electrosurgery and scalpel methods. Some studies have examined human specimens and some animal specimens [20-22] Some have studied these methods in skin incisions and some in mucosal incisions [23]. However, none of the studies have examined these two techniques during orthodontic incisions. Orthognathic surgery corrects acquired and genetic defects and deformities of the maxillofacial jaw [24]. These types of surgeries have their own

complexities. For example, improper placement of bone fragments, infection, bleeding during surgery, pain after work, tissue damage, including nerve tissue, the three basic principles of surgical success are the presence of a skilled surgeon, accurate treatment plan and selection of the most appropriate materials and equipment [25-27]. Today, the tools and materials available for oral surgery are significantly advanced. One of the most suitable devices for intraoral use that has attracted the attention of surgeons today is the electrocautery device (electrocautery) [28]. The electrocautery technique has been used in dentistry for a long time and various studies have been done to investigate the effects of this technique on different tissues. The advantages of using a scalpel include ease of use, accuracy and reduction of damage to adjacent tissue. The electrocautery also has unique benefits, such as increased homeostasis, sterilization of the affected area, and incision-free incisions that prevent trauma to adjacent tissues. In addition to the benefits mentioned for the electrocautery, the use of thermal energy to create surgical incisions also raises concerns [29-31]. Lateral injuries due to increased temperature in the operated tissue as well as adjacent tissue, incomplete wound healing, necrosis of the incision area and subsequent postoperative infection are among these concerns. In the present study, which was performed with the aim of comparing electrocautery technique and using a scalpel, 20 people were studied. The results showed that the use of electric incisors compared to the scalpel significantly reduces the incision time, but the scar tissue created in the electrocautery method was significantly more than the scalpel technique [32-34]. This can be attributed to induced heat damage to adjacent tissues. Some researchers have conducted a systematic review study comparing skin incisions from electrocautery and scalpel, and after reviewing 606 articles on electrocautery and 628 articles on scalpel, such a result Concluded that there was no significant difference between the two techniques in terms of wound infection. However, the incision time, postoperative pain and bleeding of the patient in electrocautery method are significantly less. During their study, the researchers examined the technique of electrocautery and scalpel in thyroidectomy [35-37]. Histological examinations performed in this study showed that tissue damage was more in electrocautery technique and as a result, tissue edema was more in the area. The results of other studies have shown that heat damage to adjacent tissue during electrocautery has caused nerve damage in the area, delayed wound healing, and in addition, compared to scalpel, the final cosmetic results have not been satisfactory. The results of the present study did not agree with some studies in terms of incision time. Researchers in a systematic review study

compared scalpel and diathermy methods in creating skin incisions [38]. The results of this study showed that the use of diathermy method, in addition to reducing the cutting time, reduces bleeding during work. This reduction in time can be related to the reduction of bleeding in the area. Using its electrosurgery method causes homeostasis in the area and eliminates the need for additional surgeries in this case [39]. On the other hand, the surgeon's vision and access to the operation site, which is one of the basic points of surgery, increases in this technique, while it will not be the case in the scalpel method. Other researchers in their study examined the incision made by the diathermy method in comparison with the scalpel method. The results of this group of researchers showed that the two methods were different only in the case of postoperative pain and in other areas such as infection and bleeding at work and the incidence of dehiscence there was no significant difference between the two groups.

Conclusion

The present study showed that the scar tissue created by electrosurgery was significantly more than the scalpel technique, which can be attributed to the induced heat damage to adjacent tissues. The results of the present study showed that the use of a cutter compared to a scalpel significantly reduces the incision time. The results of the present study also showed that the incidence of dehiscence was not significantly different. Studies have shown that during surgery, there is always the possibility of injury to medical personnel with sharp objects, which is not only problematic in itself, but can lead to transmission of some blood diseases. According to studies, 18% of the injuries in the operating room were related to the scalpel and 41% to the suture needle. As a result, the use of electrosurgery, in addition to the benefits mentioned, paves the way for the removal of the scalpel from the operating room, which itself has significant and independent benefits.

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