



Influence of kinesiologic tape on postoperative swelling, pain and trismus after zygomatico-orbital fractures



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ABSTRACT

Surgical treatment of zygomatico-orbital (ZO) fractures is a common procedure in maxillofacial surgery. Often accompanied by pain, trismus and swelling, postoperative morbidity is a major disadvantage, affecting patients' quality of life. The appliance of kinesiologic tape (KT) improves the blood and lymph flow, removing congestions of lymphatic fluid and haemorrhages. The aim of this study was to find out if the application of kinesiologic tape prevents or improves swelling, pain and trismus after zygomatico-orbital fracture surgery, improving patients' postoperative quality of life.

A total of 30 patients were assigned for treatment of zygomatico-orbital fractures and were randomly divided into treatment either with or without kinesiologic tape. Tape was applied directly after surgery and maintained for at least 5 days postoperatively. Facial swelling was quantified using a five-line measurement at six specific time points. Pain and degree of mouth opening was measured. Patient's subjective feeling and satisfaction was queried.

The results of this study show that application of kinesiologic tape after zygomatico-orbital surgery significantly reduced the incidence of swelling with an earlier swelling maximum, and decreased the maximum turgidity for more than 60% during the first 2 days after surgery. Although, kinesiologic tape has no significant influence on pain control and trismus, mouth opening increased earlier after operation in the kinesiologic tape group compared to the no-kinesiologic tape group. Furthermore, patients with kinesiologic tape felt significantly lower morbidity than those without kinesiologic tape. Therefore kinesiologic tape is a promising, simple, less traumatic, economical approach, which is free from adverse reaction and improves patients' quality of life.

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1. Introduction

Midface fractures involving zygomatico-orbital (ZO) fractures are common in maxillofacial surgery (Rogers et al., 2000, Erdmann et al., 2008, van den Bergh et al., 2012, Gassner et al., 2003, Naveen Shankar et al., 2012). Often attended by pain, trismus and swelling,

postoperative morbidity is a major disadvantage, affecting patients' quality of life (Miloró, 2004, Trivellato et al., 2011, Folkestad et al., 2006). Tissue reactions are thought to arise from the inflammatory response as a direct and immediate consequence of the surgical procedure (Samad et al., 2001). Complications as haemorrhage emphysema or sepsis may occur (Trivellato et al., 2011). The adverse effects of ZO surgery on life quality have been reported to be increased in patients who experience swelling, pain and trismus. It seems appropriate to study the causes and the effects of ZO fractures managed by open reduction and rigid internal fixation at the present time, when economic factors are included in assessment of the

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treatment. The break in social and professional activity of injured individuals and the scale of the problem indicates the necessity to reduce or eliminate these side effects, thus, improving patients' satisfaction after treatment of ZO surgery (Calderoni et al., 2011).

Several methods to control the immediate inflammatory response associated with head and neck surgery have been described and used, including the use of drugs such as analgesics (Kim et al., 2009; Aznar-Arasa et al., 2012; de Sousa Santos et al., 2012), corticosteroids (Markiewicz et al., 2008; Thoren et al., 2009), antibiotics (Knepil and Loukota, 2010; Andreassen et al., 2006) and proteolytic enzymes (Al-Khateeb and Nusair, 2008), laser application (Markovic and Todorovic, 2007; Roynesdal et al., 1993) or physical therapeutic methods like cryotherapy (Rana et al., 2012) or manual lymph drainage (MLD) (Szolnoky et al., 2007). No single modality of management significantly prevents and/or significantly reduces the occurrence of swelling, pain and trismus without potential undesirable side effects. Therefore further techniques for a better pain, swelling and trismus control should be developed for patients who undergo ZO surgery.

After its introduction in the 1970s, kinesiologic tape (KT) has increasingly become popular in the treatment of sport injuries and a variety of other conditions. There are several claims to the effects of KT including supporting injured muscles and joints, relieving pain, and increasing blood and lymph flow in the injured area. However, there is still little evidence to support these claims and much more research is necessary (Williams et al., 2012; Morris et al., 2012). The use of KT in the management of lymphoedema is gaining popularity. The tape is similar in weight to the epidermis, and lifting the skin, KT improves the blood and lymph flow, removing congestions of lymphatic fluid or haemorrhages (Chou et al., 2012). By providing space, fluids are encouraged to move from areas of higher pressure towards the area of lower pressure, guided by the tape to the desired direction of drainage (Kase et al., 2003). Using this technique may be beneficial for postoperative treatment after head and neck surgery, accelerating drainage of tissue reaction or haemorrhages.

The goal of this study was to find out if the application of KT prevents or improves swelling, pain and trismus after ZO surgery, improving patients' postoperative quality of life.

2. Material and methods

2.1. Patients

Over a period of 12 months, 30 consecutive patients were recruited and prospectively included in our monocentric, parallel-group, open label, randomized clinical trial. 14 female and 16 male patients were enrolled (mean age and standard deviation, 41.4 ± 18.5 years; age range, 18–74 years). Based on the CONSORT 2010 checklist for randomized, controlled, clinical trials (Cochrane Collaboration, Manchester, UK) participants were randomized into two study groups: (i) KT group; (ii) no-KT group. Blinding and placebo control were not possible due to the nature of the KT. Inclusion criteria were: zygomatico-orbital fracture, zygomatic-maxillary fracture involving orbital floor, indication for open reduction and internal fixation if necessary. Exclusion criteria were isolated zygomatic arch fracture, sensitivities to tape, inflammatory reactions after surgery, unwillingness to shave facial hair and known allergies to medication used in the study.

2.2. Operation

All operations were performed by two board-certified and specialized Oral and Maxillofacial Surgeons (BHM, CP) under general anaesthesia using nasal intubation. Surgery was performed in

sterile conditions following a standardized operation protocol and using standardized approaches from the upper eyelid (blepharoplasty approach), transconjunctival and transoral (if necessary). The reduction of the zygoma was performed by transbuccal hook retraction. Internal fixation was achieved using miniplates (matrix midface plating system, Synthes®, Switzerland). The orbital floor was reconstructed using flexible and resorbable Ethisorb patches (Ethicon, Norderstedt, Germany). Mean operation duration varied from 45 to 60 min.

A single dose of antibiotics (Ampicillin/Sulbactam Kabi 2000 mg/1000 mg) was given preoperatively. All patients stayed in hospital for at least 72 h after surgery. Patients received routine postoperative instructions: Ice pack application for 6 h after surgery, alternating 30 min of application with 30 min of no application. All patients received the same postoperative analgesic drug therapy of 1000 mg Paracetamol (Perfalgan®) intravenously 2 times per day for 3 days; and 600 mg Ibuprofen (Ibu-Ratiopharm®) orally (1st day: Ibuprofen 600 mg 3 times per day, 2nd day: Ibuprofen 600 mg 2 times per day, 3rd day: Ibuprofen 600 mg 1 time per day, 4th day: Ibuprofen 600 mg 1 time per day). There were no postoperative complications.

2.3. Taping

All taping procedures were performed by the same investigator (OR) a certified K-Taping therapist. Skin was cleaned and freed of moist and oils prior to application; if necessary the area was shaved. All tape applications were performed using skin coloured K-Active Tape Classic®, 50 mm × 5 m (K-Active Europe GmbH®, Wiesthal, Germany). Tape length was individually measured for every patient starting at the clavicle to the point of highest swelling. The tape was cut into three equal stripes (approximal 1.5 cm wide). Tape endings were rounded down. The tape was carefully removed from paper backing, trying to touch the adhesive as little as possible. The base was placed slightly above the lymph node area to which the drainage is being directed (supraclavicular nodes). The patient was moved into a stretch position. Tails were placed on to the skin with slight tension (20%). Placement of the lymphatic stripes was directed at the appropriate lymphatic duct crossing the cervical, sub mental, mandibular, submandibular, preauricular and parotid nodes, crossing the zygomatic arch, reaching the infraorbital rim and frontozygomatic suture surrounding the lower eye (Fig. 1). After application the tape was lightly rubbed to activate the medical grade acrylic adhesive. The tape was left for at least 5 days. Edges were trimmed if tape lifted before removal.

2.4. Measurements

All measurements were performed by one of the investigators (OR) at six specific time points (T): Pre-operative (T-1), Baseline (BL) = directly after operation (T0), first (T1), second (T2), third (T3) and seventh (T4) postoperative day.

2.4.1. Swelling

Swelling was assessed with a five-line measurement using a standard plastic tape measure (accuracy ± 0.5 mm) placed in contact with the skin: (Line a) most posterior point tragus – most lateral point lip commissure; (Line b) most posterior point tragus – pogonium; (Line c) most posterior point tragus – lateral canthus of the eye; (Line d) lateral canthus of the eye – most inferior point angle of the mandible; (Line e) most inferior point angle of the mandible – middle of the nasal bone (Fig. 2). Marking endpoints for subsequent tape measurements were drawn, using a fine water-proof felt tip pen.

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