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The use of interosseous dental wires and sutures for internal fixation in a patient with multiple comminuted middle facial fractures and facial nerve injury: A demonstrative case report

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ABSTRACT

INTRODUCTION: The use of plates and screws for facial fractures is considered the gold standard; providing accurate reduction and rigid fixation.
CASE REPORT: We report on a case with multiple comminuted middle facial fractures and concurrent facial nerve injury. The fractures were fixed with a combination of interosseous dental wires and polypropylene sutures with a satisfactory outcome.
DISCUSSION: We aim to demonstrate two main advantages of wire/suture fixation in such cases when compared to plates and screws. Wire/suture fixation does not require periosteal dissection for fixation; and hence there is more preservation of the blood supply of the bony fragments. Furthermore, in the setting of concurrent facial nerve repair, the use of plates may risk re-injury of the repaired nerve during the late removal of the hardware. Interosseous wires/sutures do not require late removal and this is another advantage in these cases.
CONCLUSION: Interosseous dental wires and polypropylene sutures may be considered for fixation of multiple comminuted middle facial fractures and concurrent facial nerve injury.

1. Introduction

The use of plates and screws for facial fractures is considered the gold standard; providing accurate reduction and rigid fixation. Dental wire fixation of middle facial fractures was used before the era of rigid fixation and is now considered obsolete.

In this communication, we report on a case with multiple comminuted middle facial fractures and concurrent facial nerve injury. The fractures were fixed with a combination of interosseous dental wires and polypropylene sutures with a satisfactory outcome. We aim to demonstrate the advantages of wire/suture fixation in such cases when compared to plates and screws. The work has been reported in line with the SCARE criteria [1].

2. Case report

A 50-year-old industrial worker fell from significant height onto his face; hitting a sharp heavy metal object. He sustained a transverse laceration across the left side of the face extending from the nose to the tragus (Fig. 1a, b). There were multiple comminuted facial fractures including the left nasal bone, inferior orbital rim, orbital floor, lateral orbital rim/wall, zygoma (with comminution of the zygomatic arch), maxillary sinus, a left hemi-Le Fort I fracture, and alveolar fractures of the mandible (Fig. 2a, b) There was also concurrent left facial nerve injury with complete loss of function of the temporal, zygomatic, and upper buccal branches of the facial nerve.

The patient arrived to our hospital via Ambulance. He had an unremarkable past medical, surgical, family, psychosocial, and pharmacologic history. There was severe bleeding from the facial wound and also intra-orally with suspected blood aspiration; requiring immediate intubation upon arrival to the emergency department. Initial assessment was by the trauma team who ruled out spine, thoracic, abdominal and long bone injuries; and stabilized the patient hemodynamically (the patient required several units of blood transfusion). Tracheostomy and bronchoscopy were done by the ENT team. Ophthalmic assessment showed preserved vision with diplopia and entrapment of the ocular muscular of the left eye. The plastic surgery team (led by the senior author, MMA) performed open reduction and internal fixation of all his facial fractures using a combination of interosseous wires and sutures. Exposure of the facial fractures was done through the existing laceration (Fig. 1) as well as through an upper gingivo-buccal incision.

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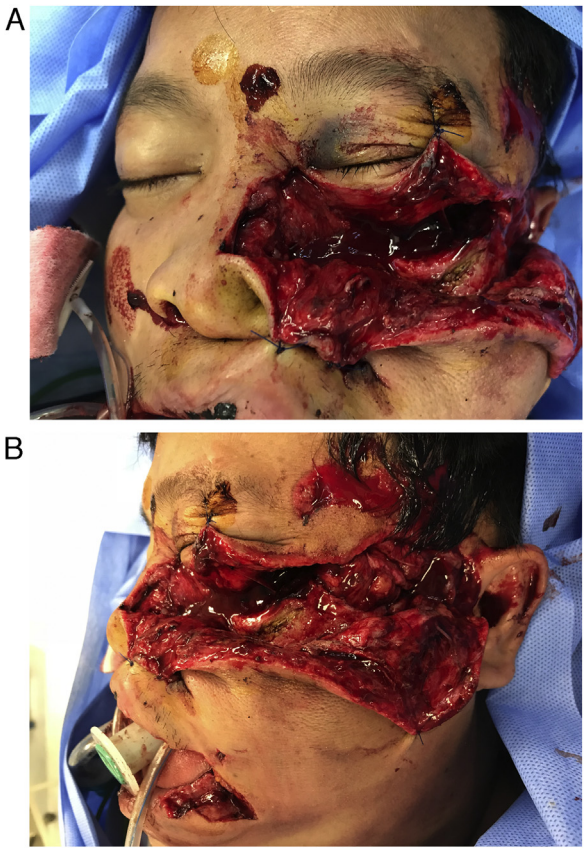

Fig. 1. a) Frontal and b) Side views of the existing facial laceration which was utilized for exposure of the naso-orbito-zygomatic fractures and also for exploration of the facial nerve. No new skin incisions were made.

Interosseous (dental) wires and polypropylene sutures were used to fix fractures of the nose, inferior orbital rim, lateral orbital rim, zygoma (including the comminuted zygomatic arch), and the hemi-Le Fort I fracture. A size 1 mm k-wire was used to drill holes in the comminuted bony fragments. Larger fragments were fixed with wires and smaller fragments were fixed with sutures. The orbital floor fracture was freed from the inferior rectus muscle and an autogenous bone graft (harvested from the anterior wall of the maxillary sinus) was used to support the orbital floor. The Lacrimal apparatus was cannulated and was not found to be disrupted. Attention was then made to the facial nerve. The frontal and zygomatic branches were sharply transected and repaired. The upper buccal branches were only contused and hence no repair was required. The facial wounds were then closed with a drain. Upper and lower arch bars were applied and maxillo-mandibular fixation restored a satisfactory occlusion. There were no post-operative complications. Post-operatively, the patient was only allowed to lie/sleep in the supine or right lateral position. The patient required a temporary left lateral tarsorrhaphy to aid in the protection of the eye. Scar management was also done after removal of the skin sutures.

Satisfactory healing of all fractures was observed (Fig. 3). At final follow-up 13 months after surgery (Fig. 4), examination showed restoration of pre-injury occlusion, full range of motion of the left eye with no diplopia or enophthalmos, full recovery of the contused upper buccal branches of the facial nerve, and excellent recovery of the repaired zygomatic branch of the facial nerve. Although there was no movement of the left frontalis muscle, there was no brow ptosis indicating that the repaired temporal branch of the facial nerve has maintained same muscle tone. The transverse facial wound across the upper face healed with a fine linear scar (Fig. 4).

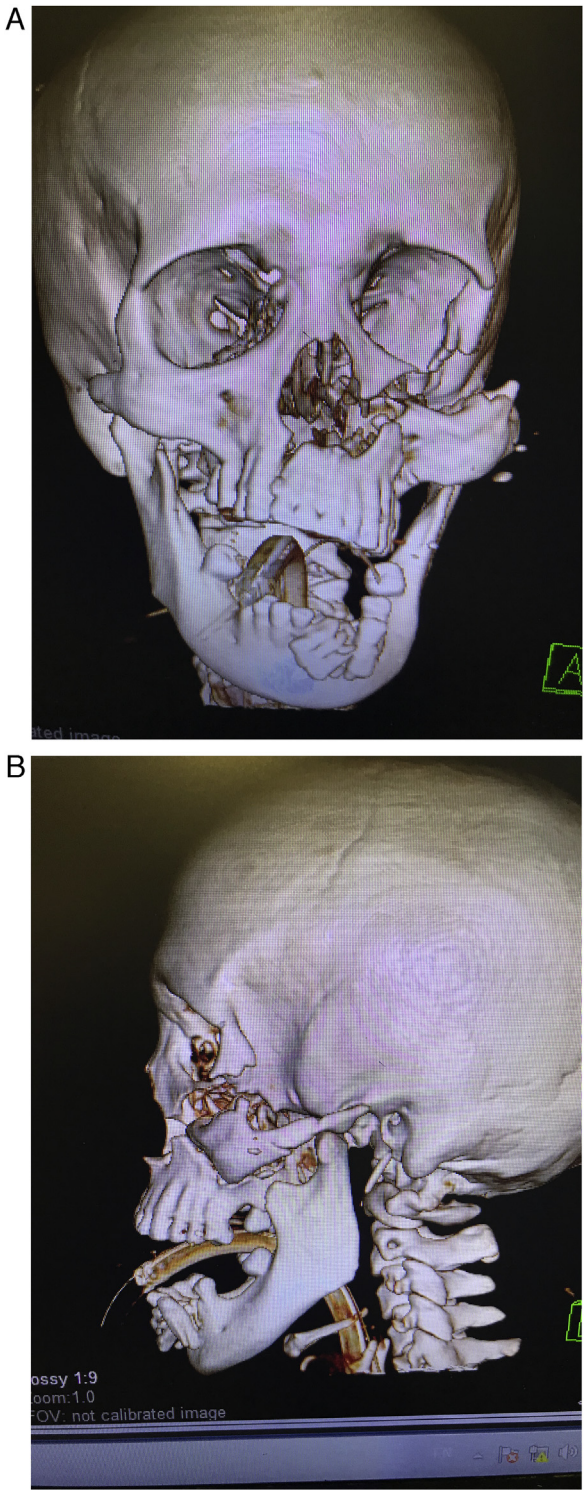

Fig. 2. Pre-operative 3-D CT scan showing the facial fractures (see text for details). A) Frontal view, b) Side view.

3. Discussion

The main aim of the current communication is to demonstrate that the use of a combination of interosseous wires and sutures for fixation of middle facial fractures may provide a satisfactory outcome. This method of fixation is currently considered obsolete, although it is still used in countries with poor resources [2–4]. Our case also demonstrates that the use of this method of fixation may

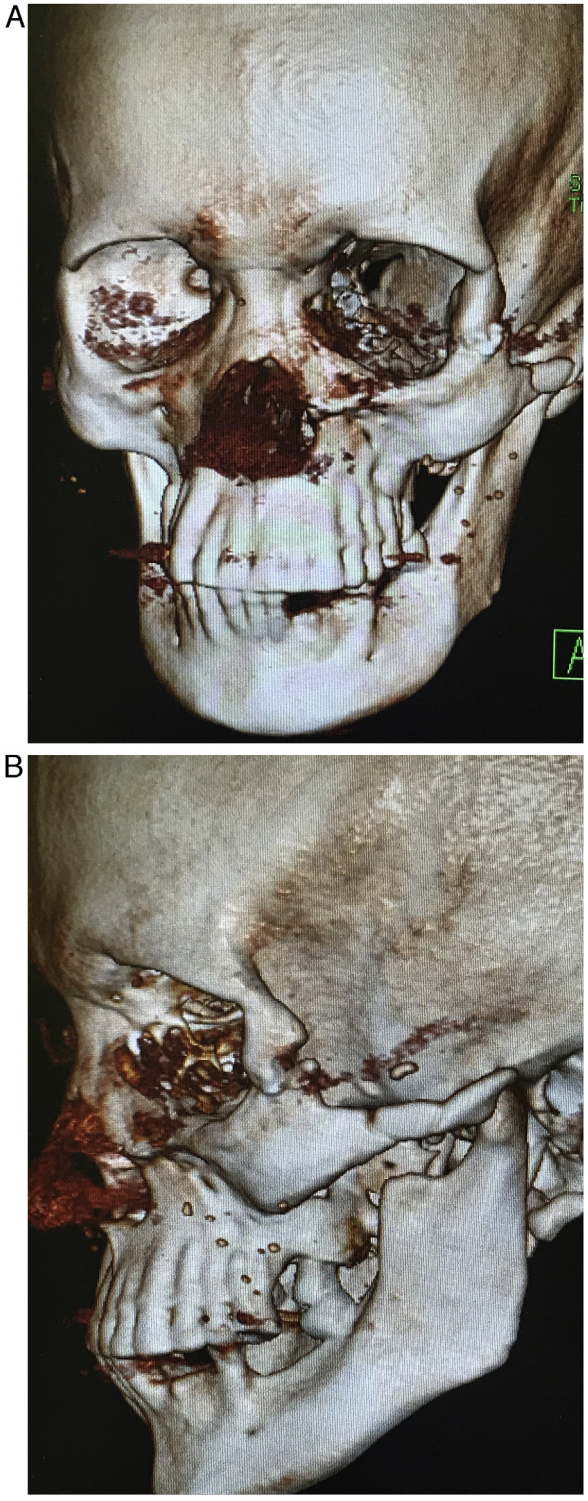

Fig. 3. Post-operative (at 13 months) 3-D CT scan showing the healed fractures. A) Frontal view, b) Side view.

still have a place (even in the presence of resources) in multiple comminuted facial fractures with concurrent facial nerve injury. In these cases, interosseous wire and suture fixation are simpler and does not require periosteal dissection for fixation; and hence there is more preservation of the blood supply of the bony fragments. However, the surgeon has to be aware that fixation is not rigid, and nursing of the patient after surgery should avoid pressure on the injured facial skeleton. In the current case, the senior author (MMA) considered using plates (in addition to the wires/sutures) in critical areas such as the orbital rim and zygoma. However, in the setting of concurrent facial nerve repair, the use of plates was abandoned since late removal of the hardware will risk re-injury of the repaired nerves. Interosseous wires do not require late removal and this is another advantage (when compared to plates) in these cases.

Finally, our case demonstrates the principles of the over-all management of severe facial trauma [5–7]. These principles include the initial assessment by the trauma team, proper protection/care

Fig. 4. Post-operative clinical photographs (at 13 months).
a) Front view of the face, b) Side view of the face, c) There is no movement of the frontalis muscle although there is no brow ptosis (see Fig. 4a), d) excellent recovery of the repaired zygomatic branch of facial nerve, e) full recovery of the contused upper buccal branch of facial nerve.

of the airway (especially in the presence of massive bleeding) with intubation/tracheostomy/bronchoscopy, assessment of vision pre-operatively for medico-legal purposes, and concurrent management and assessment of non-bony injuries of the face such as the lacrimal apparatus, the facial nerve and post-operative scar management to obtain the best functional and cosmetic outcome.

4. Conclusion

Plate fixation is the standard method of fixation of middle facial fractures. However, the need of late plate removal is frequent. If the patient underwent facial nerve repair at the time of plate fixation, plate removal may risk re-injury of the repaired nerves. In contrast, dental wire fixation is considered obsolete; but late wire removal is not necessary. We present a patient with multiple comminuted middle facial fractures and concurrent facial nerve injury. Fixation was done with interosseous dental wires and polypropylene sutures, and the facial nerve was repaired. The outcome was satisfactory. The main message from this report is to highlight the indication for using wires for facial fracture fixation in patients with concurrent facial nerve injury.

Declaration of Competing Interest

The authors report no declarations of interest.

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None.

Ethical approval

The study was approved by the research committee, National Hospital (Care), Riyadh, Saudi Arabia.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by Editor-in-chief of this Journal on request.

Author contribution

All authors contributed significantly and in agreement with the content of the manuscript. All authors participated in data collection and in writing of the manuscript. The senior author (MMA) performed the surgery.

Registration of research studies

Not applicable.

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M M Al-Qattan.

Provenance and peer review

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