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RESEARCH ARTICLE

VIABILITY OF TMAP APPROACH FOR CONDYLAR FRACTURES: A CASE SERIES AND REVIEW OF LITERATURE

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ABSTRACT

Condylar fractures are the most common fracture site of mandible. open reduction and internal fixation (ORIF) provides better outcome to those of conservative treatment for displaced condylar fractures. The risk of facial nerve palsy is one of the main Post-operative complications to ORIF. The purpose of this study was to determine the efficacy of TMAP approach in terms of rate of facial nerve injury (FNI) when performing (ORIF) of mandibular condylar fractures in comparison to other extraoral surgical approaches.

INTRODUCTION

Condylar fractures have been documented to be one of the most common occurring mandibular fractures, representing 17.5%-52% among all the cases of mandibular fractures (Villarreal et al., 2004). If left untreated, they can lead to ankylosis of the temporomandibular joint (TMJ), malfunction of the joint, occlusal disorders, or mandibular deviation. There is consensus that the correct anatomical reconstruction of the condylar process is an important prerequisite for re-establishing function. The risk of facial nerve palsy is one of the main contraindications to surgical management (Narayanan, 2009). The treatment of fractures of the condylar process remains controversial. Although it is widely accepted that the treatment outcomes of open reduction and internal fixation are superior to those of conservative treatment for grossly displaced condylar fractures. Several extraoral approaches have been advocated for condylar fractures in different literature by different authors throughout the span more than 30 years. The purpose of this review of literature was to meet the quest for versatility of TMAP approach to condylar fractures in terms of Facial nerve injury.

MATERIAL AND METHODS

A systematic review was done with 48 articles and also compared with the experience of 10 cases done by us. All the 10 cases had shown medially displaced condylar neck fractures (Fig.1), which were indicated for ORIF. All the fracture cases had been immobilized by semi rigid fixation system (Fig.3) through the Trans Masseteric Antero Parotid approach by Wilson Type I incision (Fig.2A & 2B)

RESULTS

After a thorough follow up, 48 studies regarding the applications of different approaches with variety of incisions in the treatment Condylar fractures were chosen. The outcomes of those studies were discussed to know the intensity of Prevalence of Facial nerve injury.

Traditional submandibular approach [low submandibular incision + blind subplatysmal dissection + Transmasseteric incision (the Risdon approach)]: Total 352 patients were enlisted in 13 studies, treated for Condylar Neck Fractures (n = 139) and Condylar Base Fractures (n = 107) and both Condylar

Neck Fractures & Condylar Base Fractures (n=106). The overall Transient Facial Nerve Injury rate combining all studies was 15.3% (54/352) and overall Permanent Facial Nerve Injury rate was 2.2% (8/ 352) (Eckelt, 1994; Gerbino, 2009; Handschel, 2012; Kallela *et al.*, 1995; Klotch, 1991; Mikkonen, 1989; Nikolic *et al.*, 2016; Pau *et al.*, 2016; Schon, 2011; Silvennoinen, 2015; Tasanen, 1976; Widmark *et al.*, 1999; Worsaae, 1994).

Retromandibular incision with transparotid dissection: A total of 1070 patients were enrolled in 25 studies and treated by the retromandibular approach for Condylar Neck Fractures (n = 167), Condylar Base Fractures (n = 466), and both Condylar Neck Fractures & Condylar Base Fractures (n = 437). The overall combined TFNI rate was 14.4% (155/1070) and the overall combined PFNI rate was 1.4% (Aslan, ?; Bhutia, 2014; Bindra, 2010; Bouchard, 2014; D'Agostino, 2017; Downie, 2009; Ellis, 2000; Ghezta, 2016; Giroto Riccardo, 2012; Hou, 2014; Kanno, 2016; Klatt *et al.*, 2010; Kshirsagar, 2015; Li, 2016; Li *et al.*, 2016; Lima *et al.*, 2011; Manisali *et al.*, 2003; Meeran Nazeer Ahmed, 2012; Nogami, 2012; Ono, 2001; Saikrishna, 2009; Sikora, 2015; Yang, 2012).

Retromandibular incision with retroparotid deep dissection: In 2 studies, a total of 63 patients were enrolled and treated by the retromandibular approach with deeper dissection and without entering the parotid for Condylar Neck Fractures (n = 44) and Condylar Base Fractures (n = 19). The overall Transient Facial Nerve Injury rate was 19% (1/63). The Permanent Facial Nerve Injury rate was 1.5% (1/63) (Boehle, 2015; Chossegros, 1996).

Retroauricular approach: 197 patients were treated by the retroauricular approach in 2 studies for Condylar Fractures. Among 90 cases were Condylar neck fractures and 85 cases were Condylar Base fractures and 22 cases were reported as Both Condylar Base and Neck fractures. The Transient Facial Nerve Injury rate was 3% (6/197). The Permanent Facial Nerve Injury rate was 0% (0/ 197) (Arcuri, 2012; Mohamad, 2011).

Retromandibular incision with preauricular extension and preparotid dissection (Trans Massetric Antero Parotid): Total 257 patients were enrolled in 6 studies and treated by the transmasseteric anteroparotid approach through a retromandibular access with preauricular extension, for Condylar Neck Fractures & Condylar Base fractures. There were 110 cases of Condylar Base fractures and 147 cases of Condylar Base fractures. The TFNI rate was 2.3% (6/257). There was no PFNI assessment (Hou, 2014; Li *et al.*, 2016; Mohamad, 2011; Narayanan, 2009; Ozkan, 2010; Salgarelli, 2013).

Our experience with TMAP: In our cases, we had experienced Transient Facial nerve injury in 1 case among 10 cases, which had subsided within Postoperative 6 months. No permanent Facial nerve injury had been reported. No unsightly Scar formation and incident of Parotid fistula occurred.

DISCUSSION

The most concerning complication for open reduction of Condylar Fracture is an injury to the facial nerve, which can cause temporary or permanent paralysis of the muscles of facial expression.



Fig 1.

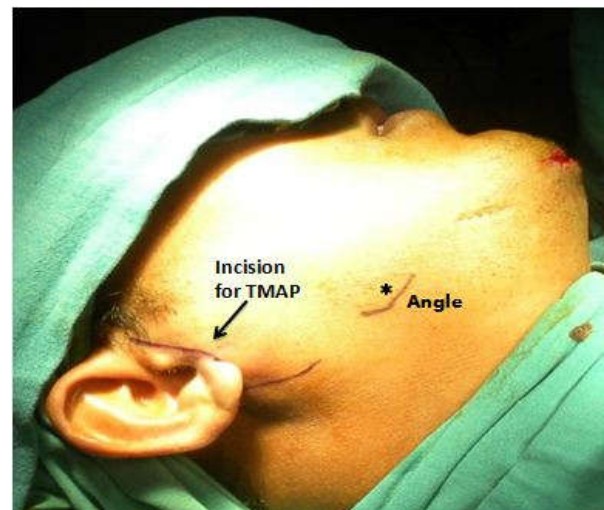


Fig 2A.

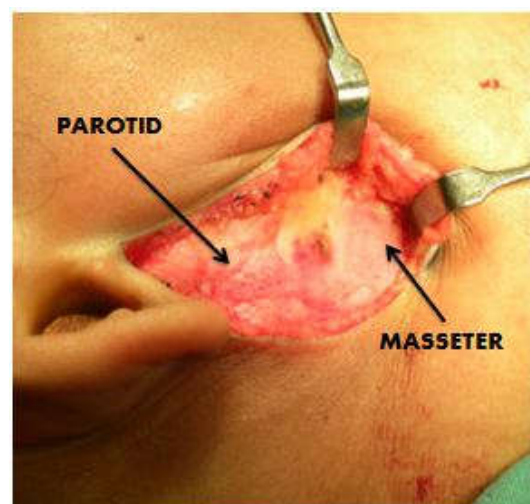


Fig 2B.

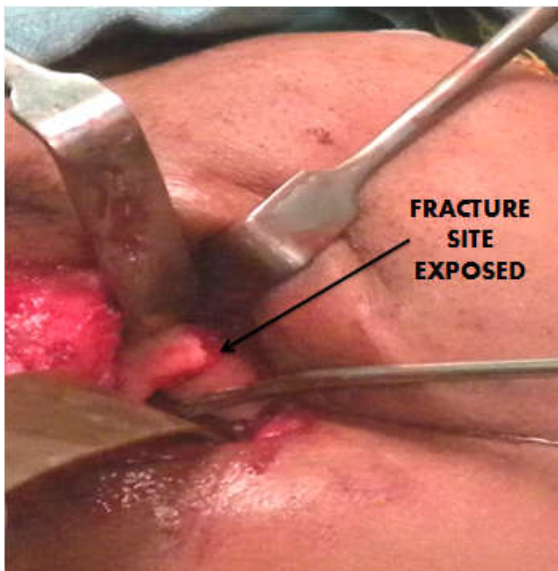


Fig.2C.

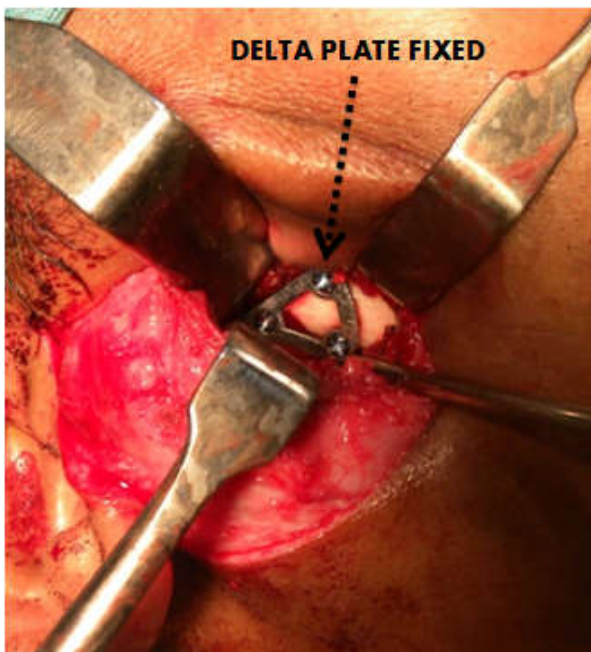


Fig. 3.

Knowing which surgical approaches are more or less likely to cause facial nerve injury is very important in the selection process for open reduction. Thus finding a safe surgical approach became necessary. The application of Risdon approach on condylar fractures seems to be historical because of several limitations like insufficient exposure to the high condylar neck fractures and access to the condylar head and neck region is difficult. The traditional preauricular, and retromandibular transparotid approaches all are associated with approximately 8-14% Facial nerve injury. Thus, almost 1 in 5 patients will experience Facial nerve injury (Arcuri, 2012; Boehle, 2015; Chossegros *et al.*, 1996; Li, 2016; Mohamad, 2011; Nam, 2013). The TMAP differs from other traditional external approaches due to the difference in the anatomical plane during approach. After the incision, the dissection is directed in an anterior-superior direction, remaining in the subcutaneous tissue superficial to the platysma and SMAS, until the anterior border of the parotid is identified and the masseter muscle is reached. Only after the masseter muscle is

reached is the dissection deepened to the bone by blunt and sharp dissection. On the other side, in a traditional retroparotid approach with retromandibular incision, following the skin incision, the dissection is directed through the platysma, posterior to the parotid gland until the mandible is reached. The dissection is below the facial nerve branches, and subsequent retraction to approach the condylar neck could result in Facial Nerve Injury. This therefore makes the TMAP technique particularly advantageous in relation to the facial nerve, for 2 reasons: the facial nerve branches are more easily identified over the masseter muscle so that the dissection to the condylar neck can be directed between the branches of the facial nerve, thereby avoiding major injury; and the preparation area at the level of the condyle pertains to the so-called "silent zone of the facial nerve." Here a plethora of facial nerve fibers intermingle and anastomose with each other. If any malfunction happens to one branch after surgery, then there is a very high chance that other branches may carry the functional duty over time (Narayanan, 2009; Wilson, 2005; Kumaran, 2012). The anatomical plane utilized by the TMAP approach provides a hazard free window to enter the condylar region which had been earlier described by Davis in his literature on surgical anatomy of facial nerve. The buccal and zygomatic branches of the facial nerve were found by Davis to divide 2.0 cm beyond the anterior edge of the parotid gland before supplying the labiobuccal muscles. The parotid duct dip medially 0.5 to 1.0 cm anteriorly to the masseter muscle (Davis, 1956). During our work, we had not experienced any exposure of buccal nerve branches in the traversed surgical plane. Postoperatively, No problems were found in facial nerve functioning (fig 4A-4C). Excellent reduction of the fractures were achieved in all cases (fig. 4D). As per the follow-up up to 6 months, no permanent facial nerve injury observed and no unsightly scar had been observed.

Conclusion

In the TMAP technique, the selection of an area adjacent the buccal branches and the formal identification of the facial nerve neutralises the chances of Injury to the Facial nerve, especially to the buccal branches. Better visibility & access gives better scope of fracture reduction and fixation for budding surgeons. Shorter working distance helps to reduce the operating time & retraction injury.

Consent: Written informed consent were obtained from the patients for publication of this case series and accompanying images.

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