Special reprint

Journal of Maxillofacial Surgery
Official Publication of the European Association for Maxillo-Facial Surgery

Volume 5 September 1977 No. 3

Reproduction only with permission of the Georg Thieme Verlag, Stuttgart.

J. max.-fac. Surg. 5 (1977) 184–186
© Georg Thieme Verlag, Stuttgart

Osteosynthesis of Orbital Margin Fractures via the Transconjunctival Approach Using Staples

(A preliminary Report)

Hermann F. Sailer

Clinic for Maxillo-Facial Surgery (Head: Prof. H. L. Obwegeser, M.D., D.M.D.), Medical Faculty, University of Zurich, Switzerland

Summary

A simple method of osteosynthesis of the infra-orbital margin is described using the transconjunctival approach.

Key-Words: Transconjunctival approach; Osteosynthesis of the orbital margin using staples.

Introduction

Osteosynthesis of the infraorbital margin cannot always be avoided in cases of zygomatic and Le Fort-II-fractures especially when they are comminuted. Conventional wiring of the fragments at the infra-orbital margin usually necessitates an infra-orbital incision. The transconjunctival approach (TCA) (*Tenzel* and *Miller* 1971, *Tessier* 1973) is in most cases not only cosmetically but also functionally superior to the infra-orbital approach. We have therefore developed a method of osteosynthesis of the infra-orbital margin by means of staples.

Osteosynthetic Materials

The staples are made from hardened orthodontic steel wire, which should produce no tissue reaction; their shape in cross-section can be either round, half-round, square or rectangular. We use wires with a cross-section of 0.425 × 0.65 mm. The staples *(Fig. 1)* are made from 5 to 15 mm lengths bending them with orthodontic pliers. The length of the free end of the staple varies from 3 to 5 mm. The angulation of the free end to the horizontal should be less than 90°, preferably between 60 and 75°. The angle of each side may be varied. After the staples are bent,

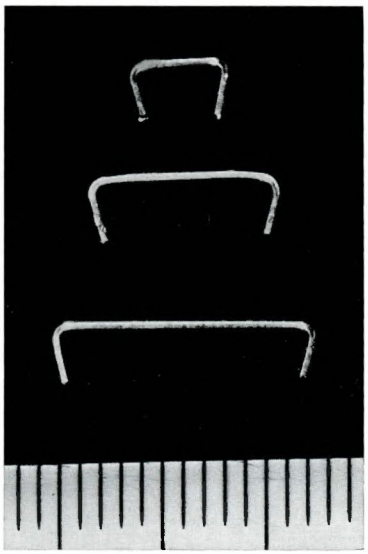


Fig. 1 Staples made from wire with a rectangular cross-section in different lengths (mag. ×4.3).

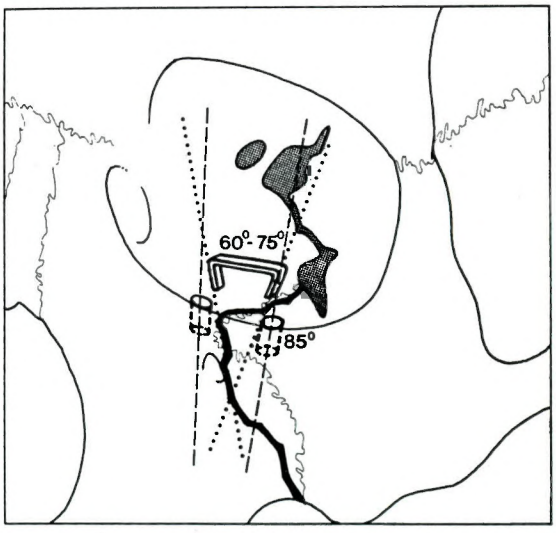


Fig. 2 The drill holes can easily be made by direct vision at an angle of about 85°.

Fig. 3 a + b
Staples on (a) and in front (b) of the infra-orbital margin. Both cases presented with fractures of the zygoma and defects of the orbital floor which were reconstructed using lyophilized cartilage. Conventional interosseous wiring was used at the fronto-zygomatic suture.



Fig. 3 a

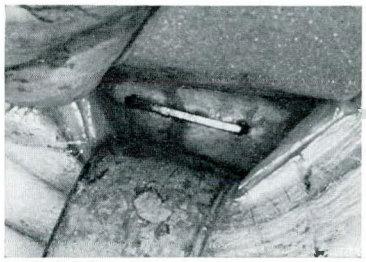


Fig. 3 b

they are annealed in a muffle oven at a temperature of 455 °C for about 10 minutes (*Thurow* 1966, *Funk* 1951, *Parr* and *Hanson* 1965).

Operative Technique

The bony fragments are re-positioned through the transconjunctival approach, small holes are drilled with burs into the thickest part of the fragments at an angle of about 85° to prevent the staples springing out of the drill holes. The drill holes are made with a small round bur in a straight hand-piece. The ends of the staples are sprung apart by two mosquito forceps prior to their insertion into the drill holes and are then firmly pushed home into the holes after removal of the forceps. Instead of mosquito forceps a specially designed stretcher may be used.

Discussion

On several occasions we have performed a *conventional* wiring osteosynthesis using the transconjunctival approach. However, this has always necessitated excessive stretching of the lower lid pulling it downwards and forwards with a consequent risk of damage to the canaliculi, and to the lower lid when the drill holes have been made from the anterior surface of the infra-orbital margin into the orbit. *Schüle* and *Weimar* (1975) have pointed out the difficulty of interosseous wiring through the transconjunctival approach. Using *staples* the drill holes may be easily made from above, downwards into each fragment. The pressure applied at the fracture site by the staple will depend on the angulation of the staple ends; the smaller the angle, the greater the pressure. It is essential that the bone fragments are of a sufficient thickness to allow adequate depth of drill holes, i.e. approximately 3 mm. To avoid damage to the small fragments, the pressure applied should not be too great; thus we do not use an angle smaller than 60 to 75° *(Fig. 2)*. Some examples of the technique are shown in the *Figs. 3 and 4.*

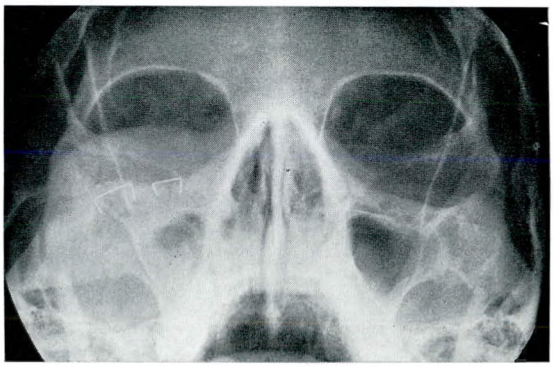


Fig. 4 Osteosynthesis with two staples in a case of an isolated comminuted fracture with a defect of the orbital margin and floor. Both defects were reconstructed using bank bone. The lateral staple fixes the graft to the orbital margin.

The use of staples for osteosynthesis has extended the indications for the transconjunctival approach (*Tenzel* and *Miller* 1971, *Tessier* 1973, *Converse* et al. 1973, *Lynch* et al. 1974, *Schüle* and *Weimar* 1975, *Sailer* 1976).

Conclusion

The use of staples for osteosynthesis of the infra-orbital rim allows advantage to be taken of the TCA avoiding at the same time some of the dangers encountered when performing conventional wiring.

Acknowledgement

I am most grateful to Mr. *K. Moos*, M.B., B.S., F.D.S. R.C.S., for assisting me in the preparation of the English text of this paper.

References

Converse, J. M., F. Firmin, D. Wood-Smith, J. A. Friedland: The conjunctival approach in orbital fractures. Plast. reconstr. Surg. 52 (1973) 656

Funk, A. C.: The heat-treatment of stainless steel. Angle Orthodont. 21 (1951) 129

Lynch, D. J., J. C. Lamp, H. P. Royster: The conjunctival approach for exploration of the orbital floor. Plast. reconstr. Surg. 54 (1974) 153

Parr, J. G., A. Hanson: An introduction to stainless steel. Amer. Soc. Metals. Metals Park, Ohio 1965

Sailer, H. F.: Erfahrungen mit dem transconjunctivalen Zugang. Paper read at the meeting of the German Association for Max.-fac. Surg., May 1976 (in press)

Schüle, H., J. Weimar: Untersuchungen zur Therapieplanung bei Orbitafrakturen. In: K. Schuchardt: Fortschr. Kiefer- u. Gesichtschir., Bd. XIX. Thieme, Stuttgart 1975

Tenzel, R. R., G. R. Miller: Orbital blow out fractures repair, conjunctival approach. Amer. J. Ophthal. 74 (1971) 1141

Tessier, P.: The conjunctival approach to the orbital floor and maxilla in congenital malformation and trauma. J. max.-fac. Surg. 1 (1973) 3

Thurow, R. C.: Edgewise Orthodontics. Mosby, St. Louis 1966

H. F. Sailer, M.D., D.M.D.,
Kieferchirurgische Universitätsklinik,
Plattenstr. 11,
CH-8028 Zurich,
Switzerland