LeFort III Distraction with Internal Devices: Long–term Follow-up

M. Chin

Children’s Hospital Oakland, Oakland, California, U.S.A.

Introduction

This paper demonstrates the long-term efficacy of advancing the midface at the Le Fort III level using, submersible, self-retaining devices and a rapid transport rate. The 22 patients in this series had follow-up between five and nine years. The results confirm that midface advancement with this method is safe, effective, and a significant benefit when compared to conventional osteotomies with rigid fixation. Assessment of the results included: (1) cephalometric analysis of bone stability, (2) esthetic facial appearance, (3) dental occlusion, (4) management of sleep apnea, and (5) morbidity.

Materials and Methods

Modified Le Fort III osteotomies were transported with internal devices with no latency. Underlying pathosis included (1) syndromic craniosynostoses (n=18), midline cleft (n=1), and tumor/radiation effects (n=2). Resistance to fragment protraction at the time of surgery is due to soft tissue. If the force of soft tissue resistance exceeds the strength of the bone anchoring the device, the bone fractures and the distraction process fails. The initial cases used custom distraction devices. The later cases used Lorenz midface distractors based on the design developed from the prior cases. During surgery, the devices were activated to the maximum transport distance tolerated pressure tolerated by skeletal integrity. The maximum distraction pressure was recorded. The distraction pressure was elevated the predetermined maximum every twelve hours until the desired transport distance had been achieved. Distances between 15 and 27 mm were achieved within 48 hours after surgery. Patients remained intubated and sedated during the distraction period. Prior to
discontinuing sedation and extubating, the percutaneous activation attachments were removed allowing the devices to be completely submerged.

The distraction devices are mounted into mortise preparations into the malar bones. The temporalis muscle is not reflected and no fixation to the temporal bone is used. In 19 patients, the access was via coronal flap. In 3 patients, the access was transoral. Use of a midface mobilizing appliance allowed dysjunction of the Le Fort III fragments without pterygoid instrumentation.

Results

Comparing longitudinal cephalograms showed the osteotomy fragments to be stable. There is no tendency to relapse despite the rapid distraction rate. Clinical photographs confirm the esthetic improvement afforded by skeletal correction is stable long term. There were no serious complications.

Case 1

A 12 year old with Crouzon syndrome and CPAP dependent sleep apnea underwent Le Fort III advancement with rapid distraction. The patient is now 7 years postoperative (fig 1,2,3). Intraoperatively, 12 mm for advancement was achieved. During the 48 hours immediately following surgery, distractors advanced the midface an additional 15 mm (fig 4). The transection activating rods were removed prior to extu-
bation. Seven years after Le Fort III advancement, the skeletal corrections remains stable, sleep apnea remains resolved, and the facial esthetics have not relapsed (fig 5).

Case 2

A 10 year old with Crouzon syndrome underwent Le Fort III advancement with rapid distraction. After four years, the correction is stable and facial esthetic improvement remains (fig 6).

Conclusions

No patients required repeated Le Fort III advancement. Additional
correction at the Le Fort III level should not be necessary if the vector of transport is correct and the magnitude of the transport adequate. Rapid transport in the immediate post-operative period spares the child the physical and emotional trauma of device activation in the clinic setting. Removing the percutaneous activating rods within 48 hours of placement limits wound care and scarring. Anchoring the devices to the malar bone has inherent safety. There is no risk of intracranial penetration of fixation screws. There is no need to place cranial bur holes to position shields to protect the temporal lobe during screw placement. Reflection of the temporalis muscle is avoided limiting the risk of at-
rophy resulting in temporal hollowing. Self-retaining design limits the risk of device displacement related to screw loosening. Use of a midface mobilizing instrument limits to risk of bleeding and sphenoid bone fracture related to the use of pterygoid osteotomes. Transoral access limits the risk inherent in repeated reflection of coronal flaps. The potential to achieve a lasting, complete correction of Le Fort III retraction in a single procedure eliminates the morbidity and mortality inherent in repeat surgery.

References


CHIN M. Transoral or coronal Le Fort III advancement: internal, self-retaining distractors. Proceedings of 2nd international congress on cranial and facial bone distraction processes. 199-209, 1999

Dr. Martin Chin has a patent license agreement with Walter Lorenz Surgical.