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Craniofacial microsomia (CFM) clinical evaluation after distraction osteogenesis (DOG)

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SUMMARY

Clinical evaluation of Craniofacial Microsomia is presented 5 years after starting the use of DOG for mandibular elongation, at the Italian Hospital, Buenos Aires, Argentina. Difficulties in management, complications, and results are analyzed. The patients were grouped according to age and vectors of elongation. Follow up ranged from 9 months to 4.9 years. In the 5 to 13 year group difficulties are related with loosening of pins. Complications are minimal and related to displacement of tooth buds. Results are good, but after 2 year follow up some patients show a delay in growth of the elongated side. Elongation rate: 12 to 22 mm. In the 15 to 22 year group difficulties and complications are related to distraction applied to previously bone grafted areas. Results are very good. Elongation rate: 22 to 32 mm. In this group all patients received complementary surgical treatment. A dental implant in a new DOG bone segment shows to be sound one year after Surgery.

INTRODUCTION

Mandibular hypoplasia is a distinctive feature in Craniofacial Microsomia (CFM) and ranges from a slight unilateral deformity, to uni or bilateral absence of ascending ramus, condyles, and micrognathia. (1).

The introduction of Distraction Osteogenesis (DOG) as a method for elongation of facial bones, opened a different approach that seemed to be as effective as free of major complications.

We started our experience with this technique in 1994 in the Plastic Reconstructive Surgery Service at the Italian Hospital, Buenos Aires, Argentina.

The purpose of this paper is to analyze our results, difficulties in management and complications in order to adjust the indications and timing for treatment.

MATERIAL AND METHODS

Between April 1994 - April 1998, twelve CFM patients underwent DOG either as the initial surgical treatment, or after previous procedures of bone grafting and calvarial parietal flaps.

The external distractors designed by F. Molina were used. The surgical procedures followed the designer recommendations. (2).

The intraoral access through vestibular incision was elected for corticotomies.

Surgeon and orthodontist planned the vectors for elongation, after cephalometric evaluation, following the lines of expected growth, and the occlusal plane in anterior projection, in order to avoid interference or open bites.

The rate of elongation, according to Elizarov principles, was 1 mm a day with a latency period of three to seven days. Distractors were retired after panorex studies and clinical control showed the elongation desired was obtained, and ossification was in progress, usually doubling the time of distraction. (3).

In an attempt to analyze the benefits of this method, and to adjust its indications, we divided this series of patients in two groups.

Group 1: CFM patients aged between 5 to 13 years, uni or bilateral, included in Pruzansky's classification I, II A and II B.

Group 2: CFM patients aged between 15 and 22 years, uni or bilateral, Pruzansky's classification II A, II B and III.

Difficulties and complications are punctually expressed. Results are considered from fair to very good regarding the objective looked for in millimeters at the moment of planning, and the functional and aesthetic improvement considering the enlargement of soft tissues. The minimum period of time for evaluation is 9 months, when complete bone remodeling is expected. (4).

RESULTS

Group I

We included eight patients aged between 5 and 13 years. Follow up between 12 and 48 months.

In six patients, unilateral elongation of the ramus was performed using unidirectional distractors. Three of them diagnosed as unilateral CFM (G I - II B) had very good results, 12 to 15 mm elongation, and growth of

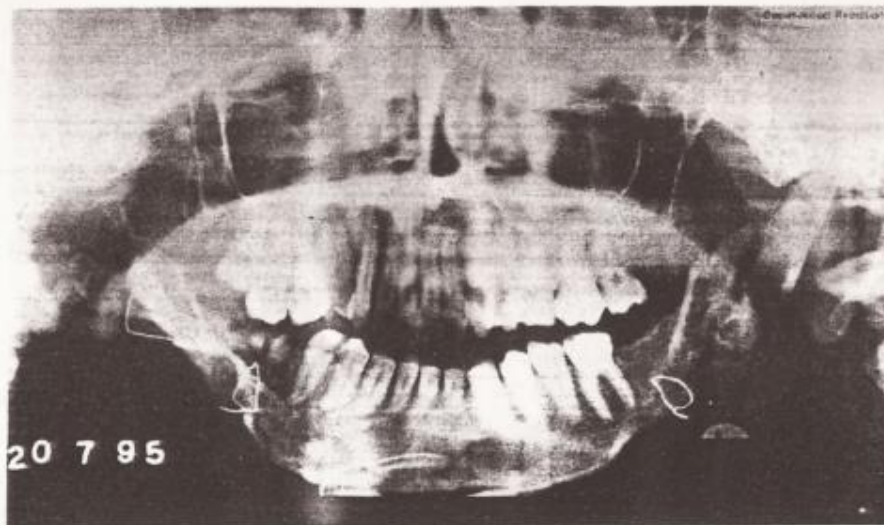


FIG 1: Preop. Panorex in a 22 y.o bilateral CFM male previously bone grafted.

soft tissues improving symmetry.

Three patients classified as bilateral CFM (G I-II B) had unilateral elongation of the shorter ramus. Two of them had very good results, 18mm elongation and facial symmetry.

The third case, a 13 year old girl with a previous parietal bone flap at age 4, had unilateral distraction in the mandibular angle previously grafted.

She had a fair result, as plan was for 18 mms and the elongation was 10 mms.

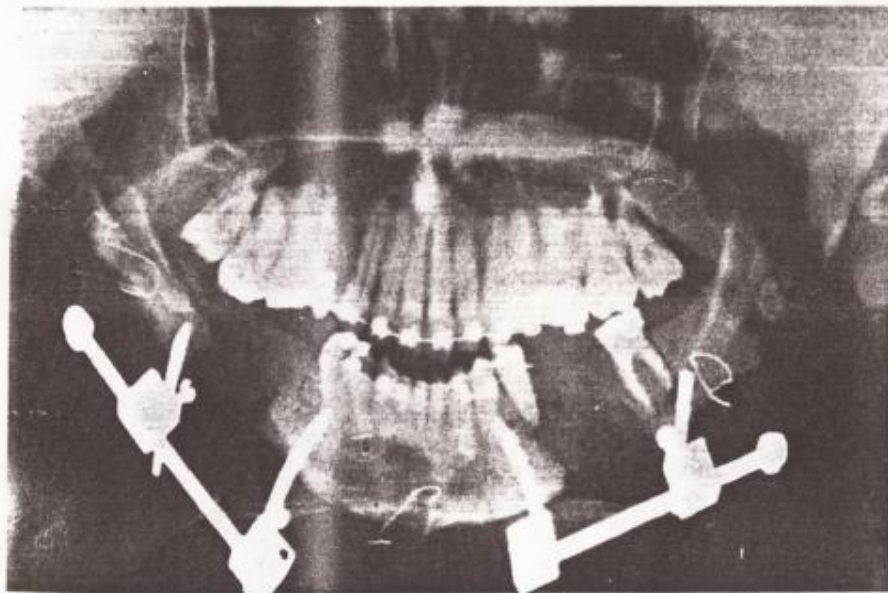


FIG 2: Post-op. Panorex at the end of mandibular bilateral unidirectional DOG.

The last two cases in this group, are bilateral asymmetric CFM (G IIA- IIB)

In both of them, bilateral bidirectional DOG was performed. The youngest, a 5 year old female had 22 and 20 mm elongation. The oldest a 13 year old male had been previously grafted at age 4 with condrocostal grafts. The access in this case was through the skin, resecting the old submandibular scars. Elongation was 20 and 22 mm. In this two patients results are considered fair.

Difficulties in this age were related to loosening of pins in three cases, and errors in handling of the external devices at patients home.

Complications in this group include mobilization of a tooth germ in one case and a backward displacement of the intermediate segment in a bidirectional DOG.

Group II

We included four patients 15 to 22 years of age. In the first two patients diagnosed as bilateral asymmetric CFM (G III-II B) we planned bilateral unidirectional DOG of the mandibular body. One of them had severe micrognathia after several surgical procedures with failure.

The elongation was 32 mm at the right mandibular body and 16 mm at the left angle. The result considering occlusion and chin projection is very good. 1 year later, Wassmund maxilloplasty and rhinoplasty were done.

The second patient a 22 year old male is also a sequela CFM. In the right side osteotomy was performed in the area where parietal bone flap was placed previously. In the left side corticotomy of the mandibular body was done between a premolar and the only molar left.

Elongation was 27 and 32 mms. The result considering occlusion is very good.

In this patient a paraescapular dermal fat flap, a rhinoplasty and mentoplasty improved his look. 2 years after DOG a dental implant was performed in the area of new bone, at the left side, proximal to his only molar left.

In the last two patients we planned bilateral asymmetrical DOG, bidirectional in the smallest side, and unidirectional in the largest.

The first patient is a Goldenhar Syndrome, CFM (G II B- IA). A bidirectional DOG in the right side and unidirectional of the left mandibular body was performed. Orthodontic correction was done starting 1 year before surgery. The result was very good, the occlusion was nicely improved, the elongation obtained was 32 and 22 mm. The last patient is a 15 y.o. female with unilateral CFM (G III) who had a condrocostal graft at age 4 y.o and a parietal flap at age 9. A bidirectional DOG was done at the affected left side and a unidirectional at the right mandibular angle. Elongation obtained was 8 and 22 mm. The midline was overcorrected to the right side, and the chin was centered. The result was very good. 2 years later she had a maxillary osteotomy and a bone graft in the zygomatic area. In this girl, during DOG there was a loosening of the cephalic fragment of bone in the grafted ramus. The vertical branch was not activated from then on and the result was not affected. This was the only complication in this group. In this group all cases were closely followed by the orthodontist who applied elastic intermaxillary traction during and after DOG.

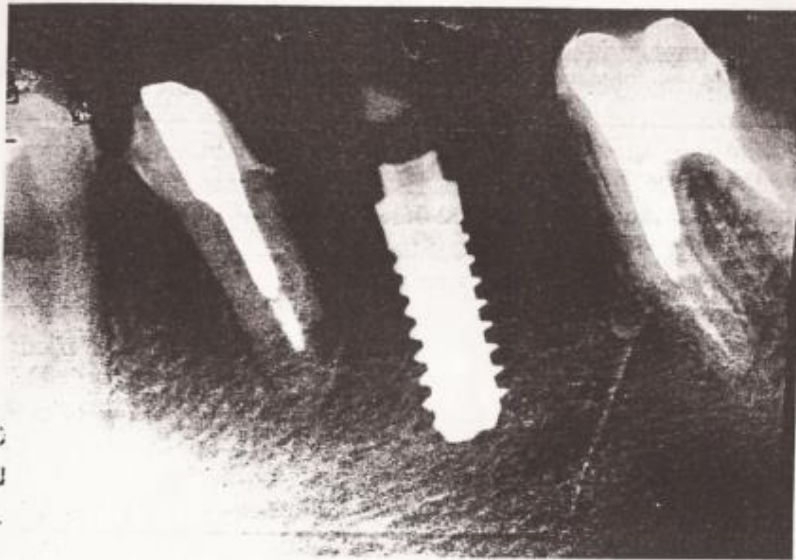


FIG 3: Localized X Ray of the distracted area after titanium implant.

DISCUSSION

There is no doubt that in CFM mandibular hypoplasia, DOG produces bone of local structure in a more natural way than bone grafting. Not only the length of the mandible is increased, but there is also enlargement of the surrounding soft tissue matrix (2,5).

In our experience, there is no reabsorption, and the strength of the newly formed lamellar bone structure has been observed, not only in follow up x ray studies, but also in second look at further reconstructive procedures.



FIG 4: Oral photograph showing the implant and finished dental work.

Another confirmation of the strength of this structure is the tolerance of a dental implant in the area of newly formed bone, and the fact that it is sound after one year functioning in a surface exposed to pressure constantly.

There is a question regarding the indication of this technique in younger children.

In this age group we observed delay in growing of the elongated side two years after surgery. In spite of this evidence, we still agree with this indication as a way to catch up with the contralateral growth, and temporarily improve symmetry.

Difficulties are few and related to the external devices used for DOG. This will most probably will be solved at the time absorbable internal distractors come in to use, avoiding a second operation for extraction of the distractors.

Complications are minimal and related to displacement of tooth germs, and sometimes lack of stability in bidirectional distractions.

In our second group there are less difficulties and complications. The results are encouraging but we need longer term follow up, to decide the timing for complementary procedures that are always necessary, up to completion of growth.

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