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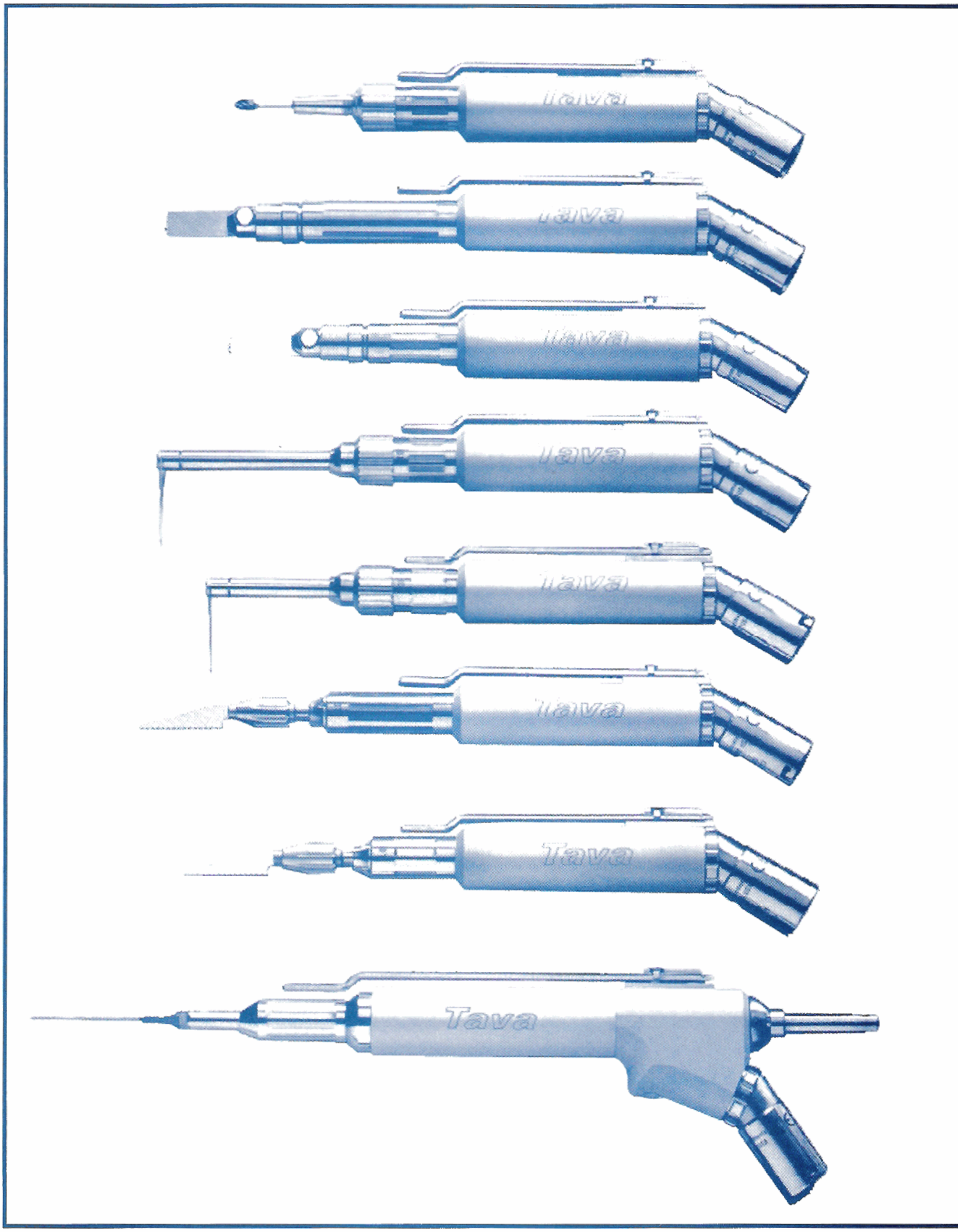
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CONTENTS

EDITORIAL

In my first Editorial for the *Brazilian Journal of Craniomaxillofacial Surgery*, last December, I stated that this would be a publication to lead us into the 21st century. Half a year later, and after some struggle, I am glad to see that this is true. Keeping a new journal alive is not an easy task; and it is possible only with our joint efforts. Therefore, I thank all of you who sent manuscripts for publication, and urge the ones who did not to consider doing it.

The first article in this issue confirms the vocation of this journal to be a forum for researchers world-wide. Nadal and Dogliotti describe their experience with nasal congenital masses. As we all know, the diagnosis of this condition is not always easy; thus, the contribution of our Argentinian colleagues has special relevance.

Next, Morano et al. discuss the long-term post-surgical follow-up of mandible fractures in children; then Minami et al. present new results of their work with polyethylene implants. At the end, once again, we have two case reports. The first one presents a case of Eagle's Syndrome which has an interesting outcome as a result of an accidental fracture of the styloid process (Grossmann et al.). Finally, Grossmann et al. present a report of a fractured miniplate requiring surgical reapproach.

In this first 1999 editorial, I would like to encourage our readers to submit their work for publication in our Journal. We want to know what you would like to read; please send your suggestions, criticisms, thoughts, and together we will be able to make of the *Brazilian Journal of Craniomaxillofacial Surgery* an essential publication in our fields.

Marcus Vinicius Martins Collares, MD, PhD
Editor

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MIDLINE NASAL CONGENITAL MASSES: OUR EXPERIENCE

Emmanuela Nadal, MD[1]; Pedro Dogliotti, MD, PhD[2]

Twenty-four patients with midline nasal congenital masses were treated from 1988 to 1997. Eight patients had encephalocele and one had glioma. Fifteen patients had dermoid cysts; nine of them were located dorsonasally, and six were located in the glabella. Eight of the dorsonasal group had indirect signs of intracranial extension, but during surgery only a fibrous cord extending to the foramen caecum was found. We have an extracranial approach to patients with indirect signs of intracranial penetration. Clinical assessment (follow-up mean: 26 months) indicated no evidence of recurrence. Preoperative CT scan or MRI provide most information to define the extent of the lesions and the optimal surgical approach.

KEY WORDS: *Nasal tumors, congenital tumors.*

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Midline nasal congenital masses are rare congenital lesions, and sometimes difficult to diagnose correctly. Differential diagnosis provides the clinician with a complex diagnostic challenge (1, 2).

Except for hemangioma, dermoid cyst, encephalocele, and glioma, categorized into congenital lesions, are treated by surgical resection. An accurate diagnosis must be done, due to the potential for intracranial extension and to the need to combine intra and extracranial approaches. Midline nasal masses are located in the frontonasal area, nasal dorsum and collumelar base, generally asymptomatic and slow-growing, sometimes associated with a dermal sinus (3) Dermoids exist like cyst, sinus, or fistulas. They may have a potential intracraneal connection via foramen cecum (4, 5).

The purpose of this article is to review a series of patients with midline masses, and to analyze the radiologic findings and their correlation with surgical observations.

PATIENTS AND METHODS

From July 1988, to December 1997, 24 patients with midline cystic masses were treated surgically in the Pediatric National Hospital "Dr. Juan P. Garrahan." Of the 24 patients, 14 were male and 10 female. Age at diagnosis ranged from a few months to 12 years (mean: 4 years). Clinical, radiologic, and surgical records were analyzed. Histologic examination confirmed definitive diagnosis.

Fifteen of these patients were nasal dermoid; eight were nasal encephalocele (encephalocele associated to facial cleft were not included); and one was a nasal glioma. Associated congenital anomalies were not present.

RESULTS

Dermoid nasal cysts appared as a firm, round mass, without fluctuation during crying, covered with normal skin. Six were located at the glabella and nine at the nasal dorsum. None of the six glabellar cases presented pathologic CT scans. In seven patients of the nasal dorsum group an enlarged foramen cecum was present. Three of them also presented distortion of the crista galli. The other two patients in the dorso nasal group presented normal CT scans.

Surgery was performed with patients under general anesthesia with extracranial approach. A vertical midline excision of the lesion in the nasal area was made. The cysts and tract were then dissected from the surrounding tissues. The periosteum was sectioned around the cyst stak to allow for further interousseus dissection. The nasal bones were fractured and separated over the dorsum and the nasofrontal suture (figure 1).

In the seven patients with pathologic CT scans, no evidence of intracranial penetration was observed during surgery. Cysts ended in a fibrous tract. No histologic studies were performed over the stalk (figure 2).

Normal CT scan patients also had **normal**

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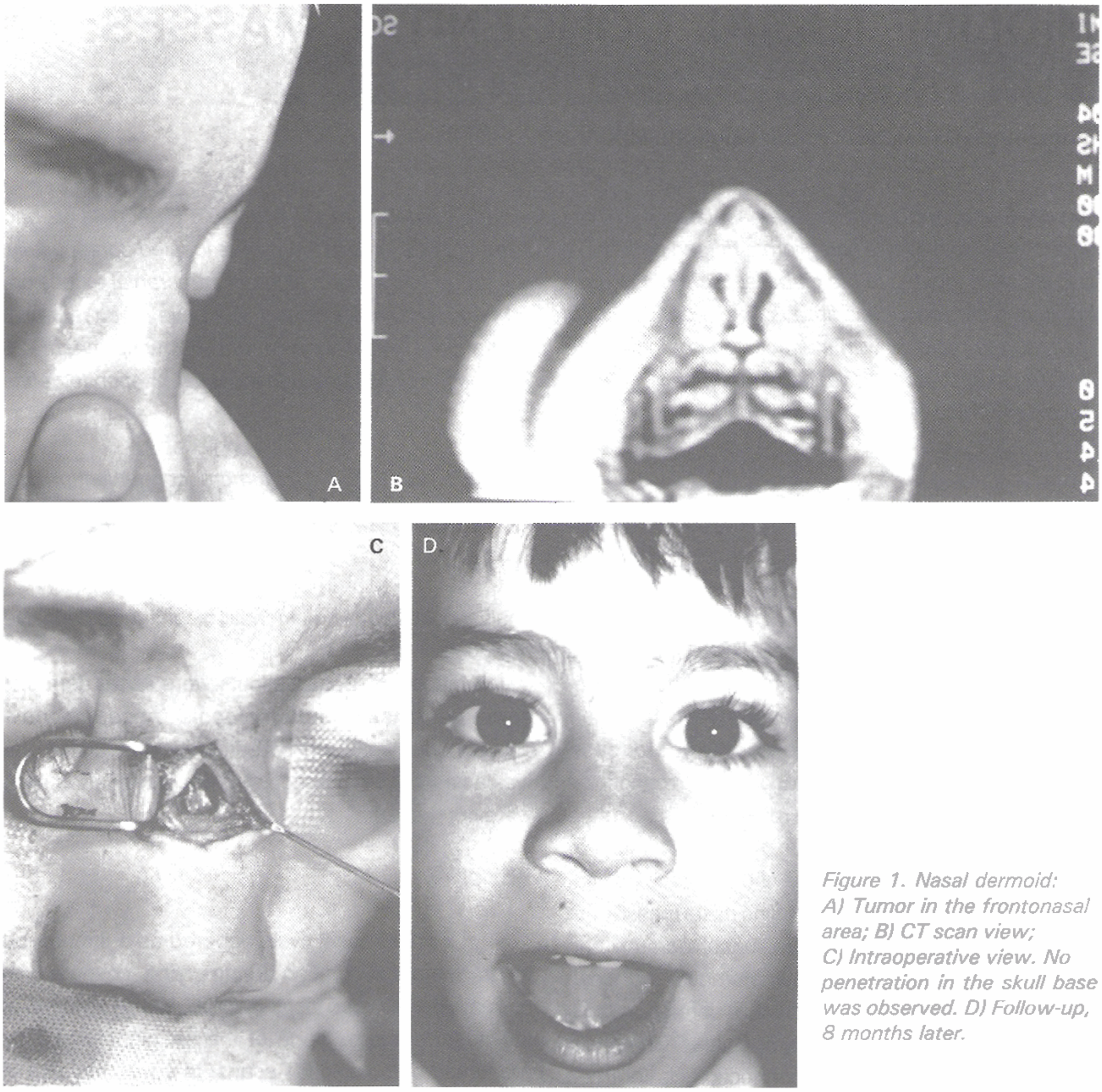

Figure 1. Nasal dermoid: A) Tumor in the frontonasal area; B) CT scan view; C) Intraoperative view. No penetration in the skull base was observed. D) Follow-up, 8 months later.

frontonasal bone architecture.

Nasal encephalocele were observed as an irregular interorbital mass, pulsating, with fluctuation in size noted during crying or straining. All patients had hypertelorism with "long nose-midface." In four patients the defect was found at the frontonasal juntion. Three patients presented nasoorbital encephalocele with destruction of the inner wall of the orbits. One patient had a frontoethmoidal encephalocele, with a large defect between the nasal bones. All patients had CT scans, and presented direct signs of intracranial communication. This was confirmed during surgery (figure 3).

Nasal gliomas, usually present at birth, are noncompressible masses. They do not fluctuate in size during the child's crying. The location could be intra or extranasal. The extranasal location can result in the frontonasal suture, through the foramen caecum, and attached to the dura. Clinical distortion of the nasal bone is observed. CT scan is usefull to diagnose extranasal locations. Our case was treated surgically with visualization and excision of the entire lesion, without intracranial communication (figure 4).

DISCUSSION

Midline congenital nasal masses had an incidence of 1/20,000, 1/40,000 births (4). Nasal dermoids, encephalocele and nasal gliomas are the most common. The intracranial extension of some of them is explained embryologically. Between the developing nasal and frontal bones there is a small fontanelle, the fonticulus nasofrontalis. A diverticula or dura, with ou without arachnoid or neural tissue, projects

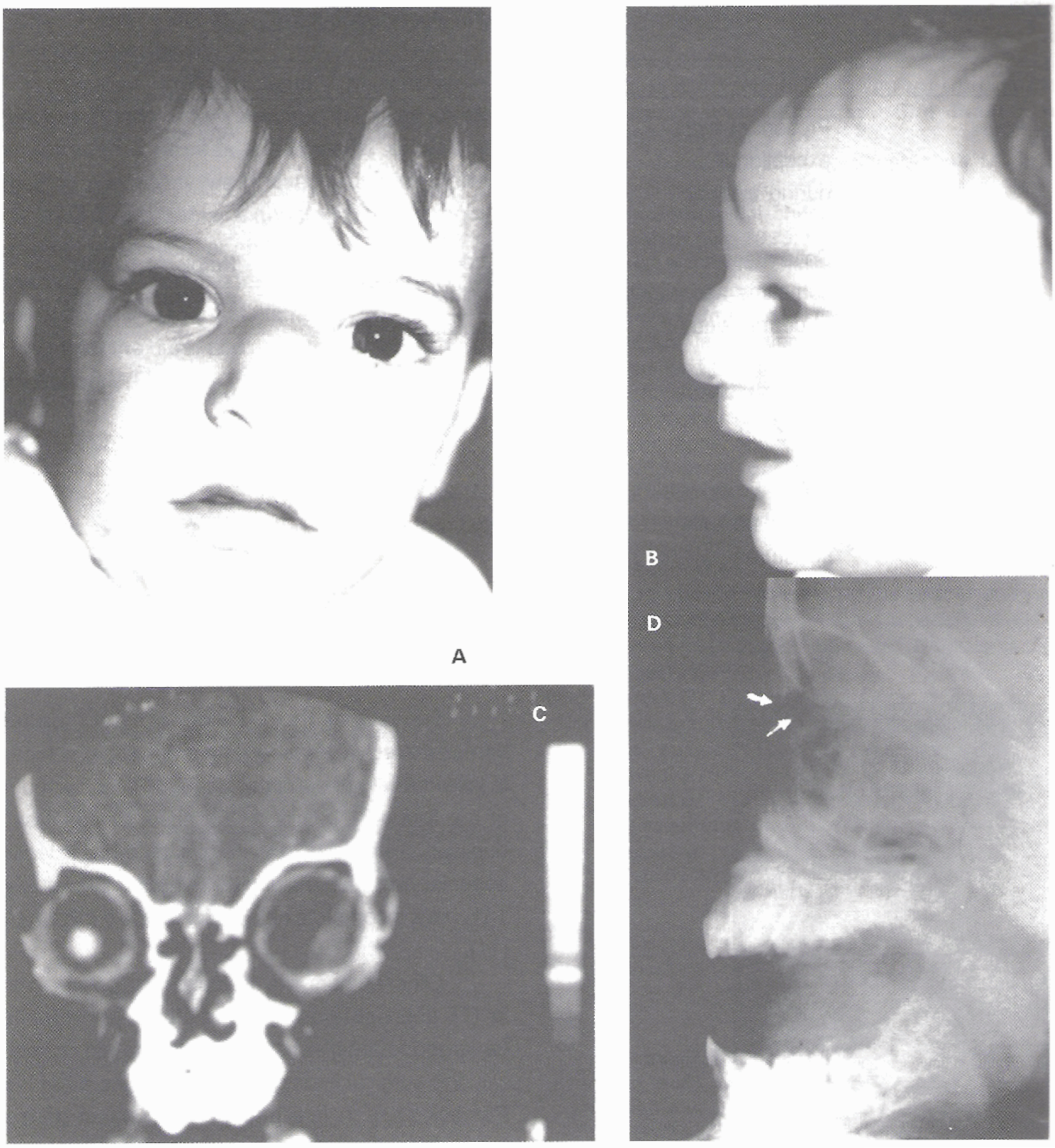

Figure 2. A, B) Patient with a midnasal tumor; C) in the CT scan an enlarged foramen caecum is observed; D) lateral cephalogram with a gap in the frontal bone. During surgery there was no evidence of intracranial communication.

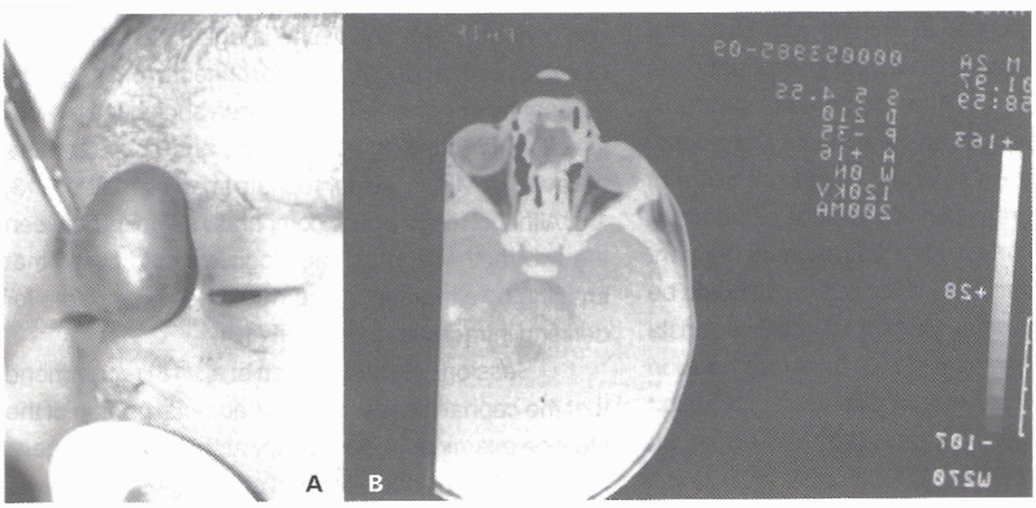

Figure 3. A) Tumor in frontonasal area; B) CT scan showing a frontonasal encephalocele.

Table 1. Diferential diagnosis in nasal midline congenital masses

	Dermoid cyst	Encephalocele	Glioma
Age	Present at birth, exceptionally during infancy	At birth	Any age
Clinic expression	Solid mass, sometime associated to dermal sinus	Blue, tender, compressible, fluctuating during crying	Purple or bluish, non compressible
Location	25% intracranial extension	Always intracranial	Varied
Histologic pattern	Epitelial cyst with mature adnexal structures	Fibrous tissue with neural and glial cells	The same as encephalocele, but with more vascularity

Figure 4. Nasal glioma in a newborn, without intracranial communication

anteriorly through the fonticulus and inferiorly to the nasal space. It may come in contact with skin. The dural diverticula regress with time, and the frontal bones grow underneath, creating the frontonasal suture. A small canal is the trace of those movements, just anterior to the crista galli named foramen caecum. Failure of the dura to separate from skin would leave ectoderm in the way and incomplete bone closure could happen. Canal bone communication of various sizes could be present. Sometimes a wide foramen with distorted crista galli is the radiologic expression of intracranial extension (6). Depending of the diverticulum contents, the lesion could be a dermoid cyst, a nasal glioma or an encephalocele (7, 8) (table 1).

Review of the CT scans of our patients demonstrated well-defined intracranial communication in patients with encephalocele (9, 10). Increased size of the foramen, bifidity of the crista or nasal septal duplication are not diagnostic of intracranial extension, especially in children under 1 year of life, of whom 14% have incomplete ossification of the cribiform plate (11).

Other authors, like us, found false positive results in CT scan studies: the radiologic abnormalities (enlarged foramen, crista bifidity) were not correlated with the surgical findings (3, 6, 8). On the other hand, Posnick (12), in five patients with nasal dermoid, presenting with indirect signs of intracranial extension, confirmed the intracranial extension intraoperatively in all five patients, using a combined single-stage intra-extracranial approach.

Although the current generation of CT scanners can give excellent soft tissue imaging in addition to a clear visualization of bony architecture, magnetic resonance imaging (MRI) has been shown to be more sensitive for imaging soft tissues, and some authors believe that MRI is the appropriate imaging method (13, 14). Although there are no comparative studies between the two methods, most radiologists would agree that imaging by either technique would be comparable for defining intracranial extension (15).

Sessions (3) and Bartlett et al. (16) recommend that the cephalic ends of the extracranial portion of the stalk be examined histologically at the time of surgery. If dermal elements are present at the biopsy, additional surgery is indicated to remove the intracranial component of the lesion.

In conclusion, all midline nasal masses cauded to the nasofrontal suture required CT scan or MRI examination to assess intracranial extension. Percutaneous biopsy was never required. Indirect evidence of intracranial extension did not require extensive intervention, or an intracranial route, in our experience. Very often, the tract extending intracranially is only fibrous, if epidermal elements are not seen in the tract near the dura, and an extended procedure is not indicated.

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LONG-TERM POST-SURGICAL FOLLOW-UP OF MANDIBLE FRACTURES IN CHILDREN

Fernando G. Morano, MD[2]; Eduardo Montag, MD[3]; Tatiana de Moura[4]; Alexandre M. Munhoz, MD[5]; Nivaldo Alonso, MD, PhD[6]; Marcus C. Ferreira, MD, PhD[7]

Mandible fractures in children are unusual because they have anatomic particularities and children are less exposed to external causes. Inadequate treatment leads to insoluble problems. Several treatment forms have been described, rising doubts regarding which is the most appropriate. Our study aims at showing the long-term results of some treatment options used in our department. By observing the long-term follow-up and the level of satisfaction of the 10 patients in our series, we noted that, despite a high rate of false positive results in the radiological postoperative assessments, we have to be as conservative as possible due to the huge bone remodelation potential in children's mandibles, and that no technique presents a significant advantage over the others.

KEY WORDS: *Mandible fracture, follow - up, children.*

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Mandible fractures in children are very unusual, due to several anatomic particularities and less contact with social violence. However, knowledge of the proper handling of such fractures is essential to avoid esthetic and functional consequences of unlikely reversibility. Based on that, several authors have proposed different forms of treatment for mandible fractures in children, from a conservative treatment with a diet of liquids to the use of resorbable plates (1- 7). As a result, a great concern about which conduct to follow has arisen, in search of the best result. Having that in mind, our study aims at showing the long-term results of the mandible fractures in children treated at the Department of Plastic Surgery of the School of Medicine at *Universidade de São Paulo* (FMUSP), in the Emergency Room and Clinics, in the past years.

METHODS

We analyzed children under 12 years of age, victims of mandible fractures, seen and treated at the Emergency Room of *Hospital das Clínicas* - FMUSP from January 1990 to December 1997. In all cases, we have tried a telephone contact followed by a summoning telegram aiming at the return of the children to our Department. The children who returned were evaluated according to their age, sex, trauma mechanism, fracture region in the mandible and kind of treatment applied in the moment of the trauma. After the return, the post-surgical evolution and the mandible were analyzed through a detailed physical examination, standardized photographs, face radiographs, panorex radiographs of the mandible and face CT scan in axial and coronal sections added to the tridimensional reconstruction emphasizing the mandible.

RESULTS

In this 8-year period, 51 children, victims of mandible fractures, have been seen and treated at the Emergency Room of HC-FMUSP. In only three cases, out of the 51 children, the phone number provided during hospitalization made it possible to locate the previously

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Table 1. Data of children in the moment of the accident

Child	Age	Sex	Trauma	Fracture region	Treatment
	7 years old	Female	Car accident	Right parasymphysis	Observation
	4 years old	Male	Car accident	Left angle	IMF[a]
	5 years old	Female	Gun shot	Left body	IMF[a]
	12 years old	Male	Car accident	Left condyle	IMF[a]
	4 years old	Male	Fall from heights	Symphysis/ Condyle	IMF[a]/suspension
	7 years old	Male	Bicycle fall	Right ramus	Wire[b]
	7 years old	Male	Bicycle fall	Left ramus	Wire[b]
	9 years old	Male	Car accident	Body and left parasymphysis	Wire[b]
	12 years old	Male	Fall from height	Symphysis and right ramus	Wire[b]
	15 years old	Male	Gun shot	Right body to symphysis	External fixator

Liquid diet for 14 days. [a]With rubber bands for 14 days, [b]Associated to IMF with rubber bands for 14 days

Table 2 correlates the fracture region to the treatment , the follow-up time and the current physical and radiological exams.

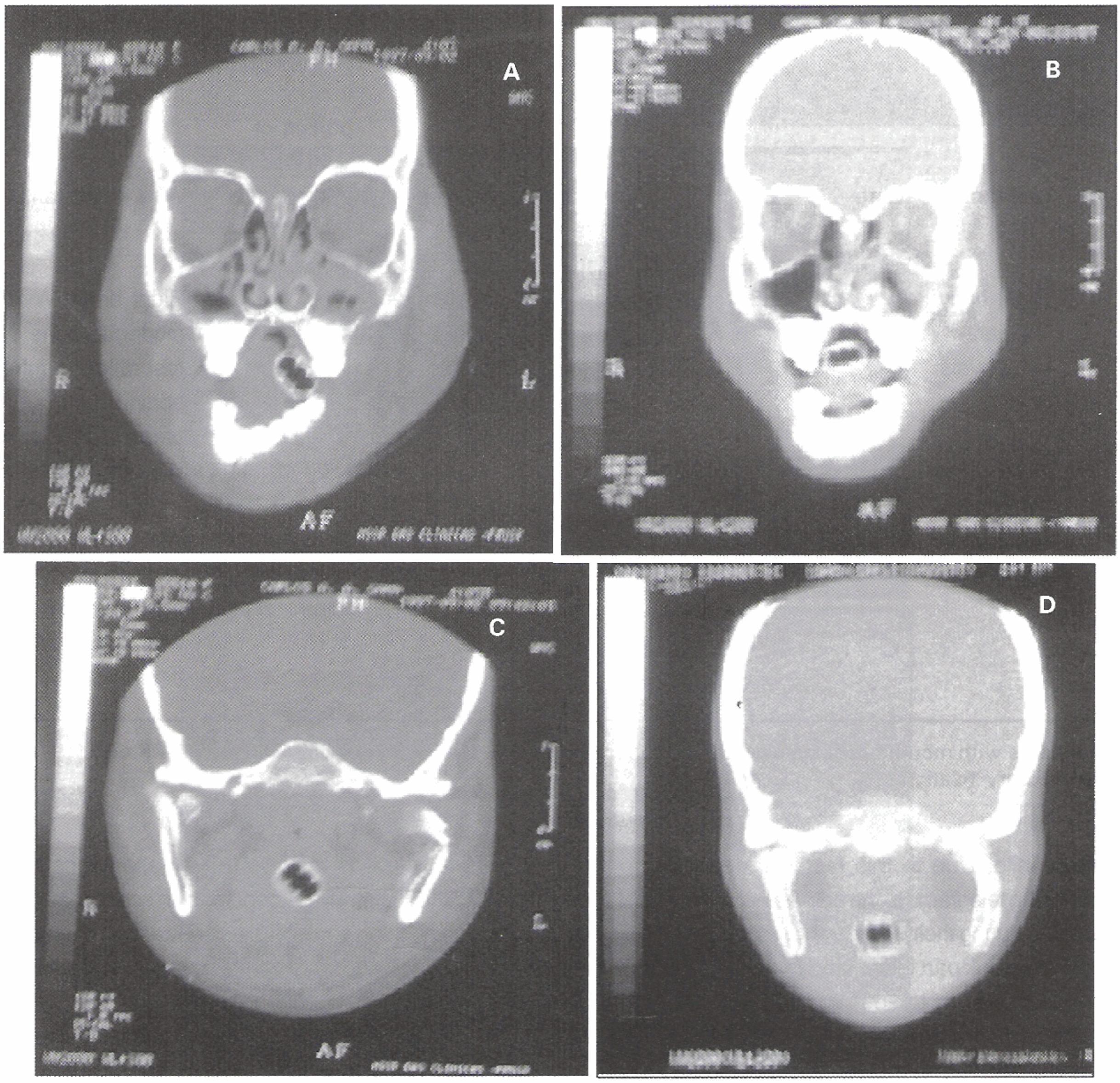

Figure 1. Patient 5. A) Right symphysis fracture; B) postoperative (IMF) of 11 months; C) condyle fractures; D) postoperative (IMF) of 11 months.

Table 2. Late post-operative follow-up data

Name	Fracture	Treatment	Follow-up (months)	Phisical exam[a]	Face Rx	Mandible Panorex	CT scan
1	Right para-symphysis	Soft diet	35	Normal	Normal	Normal	Normal
2	Left angle	IMF[b]	43	Normal	Normal	Normal	Normal
	Left body	IMF		Normal	Normal	Normal	Left condyle: medial deviation left ramus: shortening. Right condyle: irregularities in articular surface
	Left condyle	IMF		Normal	Normal	Normal	Normal
5	Condyles Symphysis	IMF Suspension	11	Normal	Normal	Deformity left ramus	Right body: wire / bone resorbtion inferior (figure 1).
6	Right body	Wire	60	Concavity in right body	Wire in right body	Bone resorbtion in inferior portion of right body	Bone resorbtion in inferior portion of right body
	Left ramus	Wire	66	Teeth loss; left latero-gnatism	Wire in left ramus	Wire in left ramus	Wire in left ramus
8	Right body left para-symphysis	IMF	43	Concavity in right body	Wires in right body, para-symphysis	Right body: curve in inferior segment whith wire	Right body: Wire/ moderate bone resorbtion in inferior portion. Left parasymphysis: wire
9	Right ramus symphysis	Wire		Normal	Wire in mandible	Wire in right ramus	Wire in right ramus
10	Right body symphysis	External fixation	12	Normal	Osteous fail in mandible	Ossification in the half inferior right body, symphysis	Without the horizontal superior part of the right mandible where child has thin metal (figure 2)

[a]All patients with mouth openning bigger than 35mm and normal sensitivity in mentonian nerve territory
[b]Intermaxillary fixation.

treated child. Due to this fact, we decided to send summoning telegrams to the addresses of the 51 children registered during their previous hospitalization. This way, 10 children took part in our study, whereas the other 41 did not attend. In table 1 we list age, sex, trauma mechanism, fracture region in the mandible and treatment applied on the day of the accident.

None of the patients mentioned any complaint after hospital discharge. No difficulties to open the mouth, to chew, or skin sensitivity alterations in the mandible topography (except for skin scar areas) were noticed by the team. No auscultation or clicking perception in the condylar topography were noticed either.

All patients were examined by a team (the patient, the mother and a fourth year medical student) that didn't find any abnormal characteristic in the fractured faces in this long-term post surgical follow-up.

DISCUSSION

Facial traumatisms in general and mandible fractures specifically are unusual in the pediatric population (8). Ellis et al. evaluated 2137 mandible fractures, and showed that only 1.8% of them affected children under 11 years (9). This occurs because the child's mandible is very small compared to the other parts of the skull, because it takes a posterior protective position and presents more elasticity due to a bigger amount of bone marrow and more resistence due to the no eruption of dental core. Besides, a thick subcutaneous cellular tissue protects from the aggression agent. Children in general are less exposed to external causes than adults (5). In spite of that, an inadequate treatment of a child with a mandible fracture

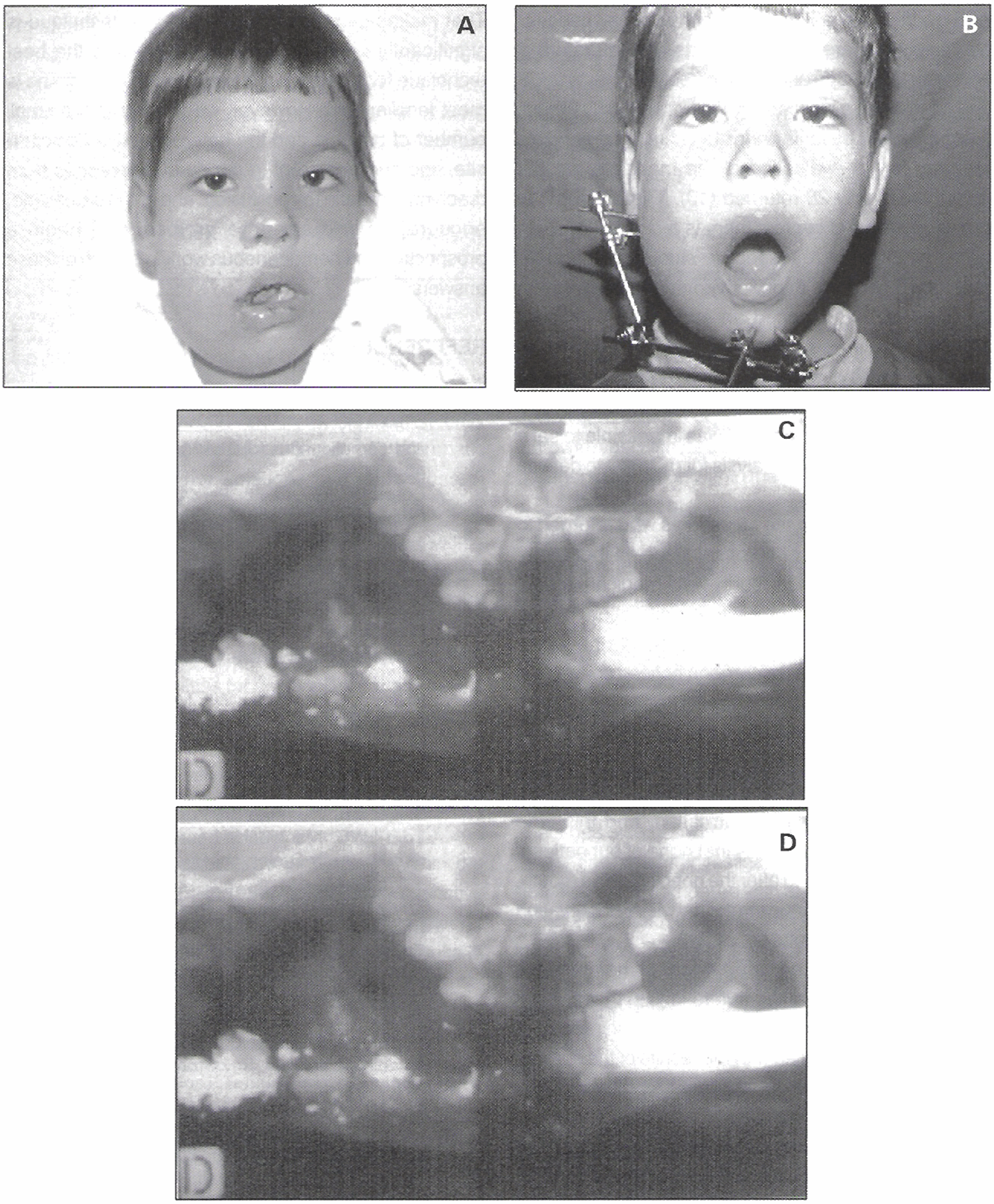

Figure 2. Patient 10. A) Gunshot at right mandible; B) two weeks post operative (external fixador); C) panorex pre operative; D) 1 year postoperative with initial reossification.

may consequences of aesthetic and functional nature, very often irreversible. Trying to avoid such consequences, several forms of treatment were proposed to treat mandible fractures in children, from the conservative treatment with liquid diet to the use of resorbable plates and external fixators. Such variety of therapeutic forms caused a certain insecurity about which would be the most adequate manner to treat these patients. Something that contributes to such insecurity much more is the fact that, due to the low frequency of this injury, there are very few reports in the literature of long-term follow-ups of mandible fractures.

Mc Guirt, a plastic surgeon from North Carolina, summoned 104 patients under 18 years, with mandible fractures for an evaluation of the mandible growth; nevertheless only 28 returned (10). That means that even in developed centers there is a huge difficulty in calling patients for retrospective studies of mandible fractures in children. In our environment, dealing with the poor, we experienced an even bigger difficulty because only three patients could be reached by telephone and out of the 51 summoned by telegrams sent to the address registered in the hospitalization only 10 attended. Due to this fact, it was impossible to set a homogeneous group of analysis for us to get to definite conclusions.

We observed in the 10 patients who returned to the hospital a feeling of surprise, since neither them, nor their mothers, nor a fourth-year medical student noticed any functional or aesthetic alteration in their faces with mandibles previously fractured. But the careful physical exam by a plastic surgeon noticed changes in the normality pattern in three patients and seven patients showed some alteration in a radiological level. These data match other studies which show a high rate of false positives in radiological exams (4).

Another important information, and this time different from the literature, is that none of our patients noticed condylar clicking after the opening of the mouth, and none showed changes in the sensitivity innervation topography of the mental nerve (10).

Due to that, even being aware of the presence of synthesis material and/or alterations in the physical and radiological exams, all patients and their mothers were completely satisfied with the results of the surgery done years ago, and did not want to undergo any surgical intervention whatsoever.

We submited our patients to different forms of treatment for different lesions. Common sense tending to conservativeness guided the choice of the most appropriate technique for each case. Aware of the huge potential of bone remodelation in children added to an increase of the metabolic rate (5) we strongly believe that mandible fractures in children must not be indiscriminately treated as adults' fractures. We must whenever possible, that is, in most of the condylar fractures, in simple fractures or with small deviations, opt for no surgical treatment (3, 6). No highly innovative technique was used. However all the patients consider their results highly satisfactory not only from an aesthetic point–of–view, but also from a functional standpoint. That makes us believe that no isolated technique is significantly better than another one, and the best technique for a certain surgeon is the one he or she is most familiar with. However, we know that the small number of patients and the heterogeneity of fracture site, age and treatment in our study prevent us from reaching any definite conclusion, and at the same time, encourage us to set up a protocol and begin a prospective and homogeneous work in search of these answers.

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THE USE OF POROUS POLYETHYLENE IMPLANTS IN PLASTIC SURGERY: AN EXPERIMENTAL AND CLINICAL STUDY

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An experimental study is presented, comparing porous polyethylene (Medpor®) and autogenous bone grafts positioned on the skull of rabbits, with or without rigid attachment. Two weeks postoperatively, tissue ingrowth was noted in the polyethylene pores, with fibrovascular infiltrate predominating; fibroadipose proliferation was noted at 6 weeks and adipose proliferation at 16 weeks. Rigid fixation with screws contributed to less resorption of the bone grafts and major osteoblastic infiltration in the porous polyethylene implants. The application of porous polyethylene implants is described in clinical cases, with satisfactory results and with no complications.

KEY WORDS: *Porous polyethylene, medpor, bone graft, rabbit, implant, autogenous bone.*

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In facial reconstructive and esthetic surgeries, the ideal materials for correction of deformities are autogenous bone and cartilage grafts. We are frequently required to repair bone deformities in post-traumatic reconstructions, tumor ablations and corrections of esthetic facial and congenital deformities. The use of alloplastic materials is justified because they obviate the following problems: donor site morbidity, increased surgical complexity, difficulty in accurately shaping the graft, and resorption.

Porous polyethylene (PP), Medpor®, offers some desirable qualities for an alloplastic material: it is widely available, resistant, has a highly stable structure; it is also malleable, biocompatible, easily sterilized and with low rates of infection (1). The pores range from 100 to 200 mm, and tissue ingrowth has been noted within this material (2). Wellisz (3), Klawitter (4), and Spector (5) demonstrated bone ingrowth within the pores of PP. Rubin (6), in 1983, reported a retrospective study of a 32-year experience with polyethylene granules utilized in facial areas, with good results in the orbital floor, malar region, mandible and skull.

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Karesh and Resner (7) reported the use of this material as an occular implant. Wellisz et al. (8) performed biopsies on 24 patients verifying soft tissue ingrowth, vascularization with mature blood vessels, and collagen deposition within the pores of the implant.

PP implants were widely utilized for facial surgeries in the nineties. Wellisz (9) described his clinical experience with 116 implants placed in 70 patients over a 4-year period. Nine complications occurred, including seven exposures. In 1993, a multi-center experience using PP in 140 patients with facial fractures was reported, with only one instance implant infection requiring removal (10). These studies reveal that the implant offers greater advantages over other materials because it is highly biocompatible with rapid tissue and vascular ingrowth into the pores of the implant, and it has also been confirmed in humans (8).

The present investigation studied the histological behavior of PP compared with autogenous bone grafts of the zygomatic arch, with and without screw fixation in rabbit skulls. The following parameters were assessed: fibrous tissue ingrowth, osteoblastic invasion of the implant, and underlying bone resorption. Clinical cases also illustrate the application of this implant.

MATERIALS AND METHODS

Experimental Study

Forty-two New Zealand female white rabbits, ranging in weight from 2500 to 3000 g were operated on. In each animal's skull, a standard PP implant (5mm x 5mm x 2mm) with 150 mm pores, and a 5-mm long autogenous zygomatic arch were inserted. The subperiosta were raised through a 15-mm transverse incision in the upper region of the animal's head, between the orbits, and PP implant and bone graft were placed in a symmetrical contralateral position (figure 1). The central region of all the implants and grafts were bored with a 1.5-mm drill. Half of the bone and PP implants were fixed in the animal's skull and the remainder were left unattached. Titanium screws

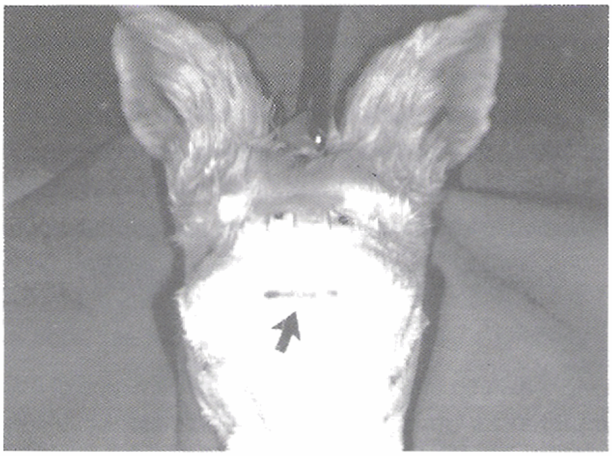


Figure 1. Rabbit head with skin incision (arrow) through which the porous polyethylene implant (left) and bone graft (right) will be implanted.

(3 mm x 1.2 mm) (Osteomed M3®) with lag screw fixation were utilized. The animals were sacrificed over 2, 6, and 16 weeks, with seven animals in each observation period. The grafts and implants removed from the skull were fixed and stained with hematoxylin-eosin.

Clinical cases

PP implants were utilized in clinical cases for

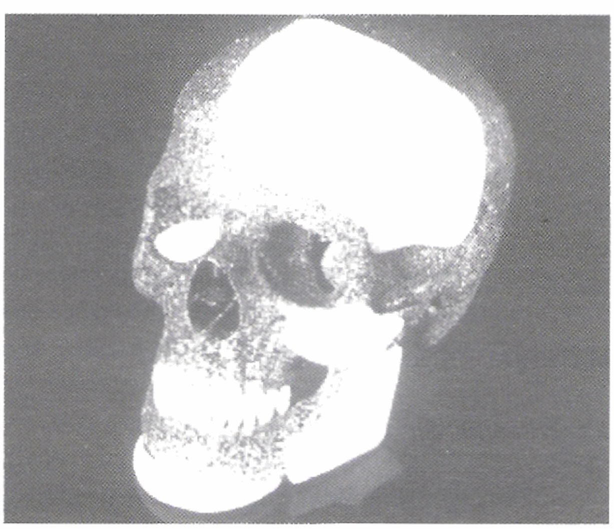


Figure 2. Porous polyethylene implants are available in preformed shapes for different anatomic locations.

reconstruction and cosmetic surgeries. Preformed PP of various sizes were inserted principally in the zygoma, chin, nasal, orbital and skull areas (figure 2). En bloc PP implants are available in various thicknesses and were easily shaped with a pair of scissors and a scalpel during surgery (figure 3). Bending is facilitated by heating the implant in boiling saline. The heat permits configuration of the implant to a new shape, which is maintaned after cooling.

RESULTS

Experimental study

Macroscopic assessment – During the periods of sacrifice, the bone grafts and implants with titanium

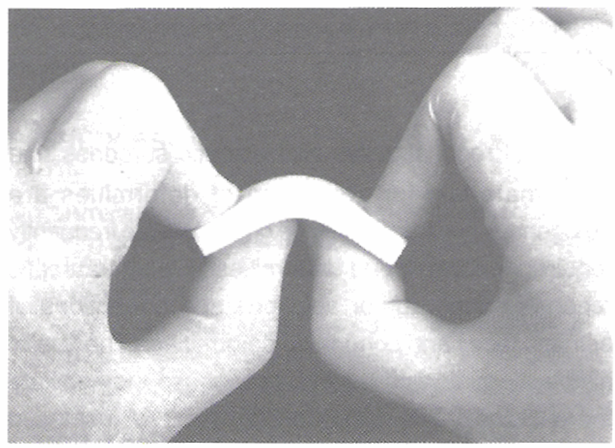


Figure 3. Sheets of porous polyethylene. Different thicknesses can be cut and can be molded in hot water prior to placement.

screws showed stability, contrary to what occurred in those cases without fixation.

Histological assessment – Two weeks postoperatively, tissue ingrowth within the PP pores was predominantly fibrovascular. At 6 weeks, partial substitution of this tissue by adipose cells was noted, with fibroadipose ingrowth, markedly so in the late 16 week period. In the majority of cases the latter was substituted by adipose tissue and described as adipose proliferation (Figures 4-6).

Porous polyethylene (PP) - All the implants that were attached with screws demonstrated ingrowth of osteoblasts (presence of 100%), whereas the non-fixed ones failed to display this in 71.4% of cases (graph 1). Migration of the osteoblasts in the majority of cases occurred in small numbers, not surpassing the proximal third of PP compared to the receptor bed. Minor cortical bone resorption was observed under the PP in the receptor site in one case (14.28%) with rigid fixation,

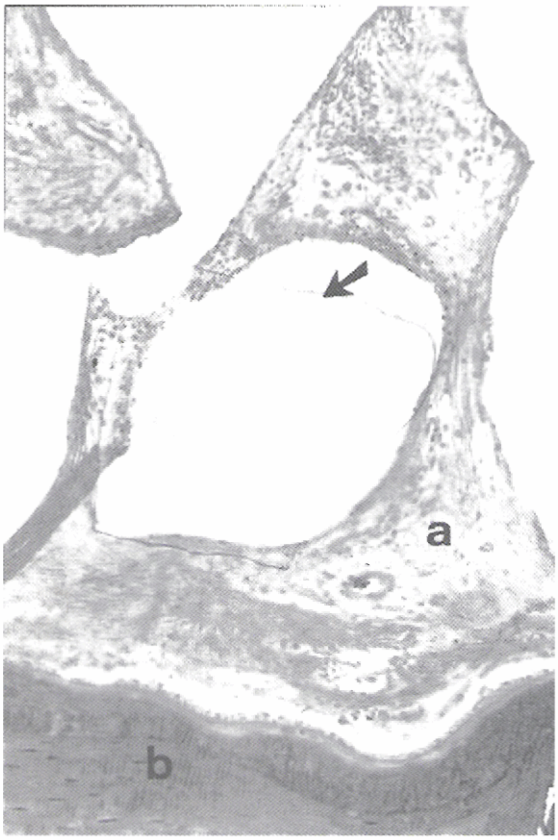


Figure 4. Photomicrograph showing fibrovascular proliferation, a) invading the porous polyethylene (arrow) at 2-week period; b) receptor bed (bone). (H.E. x400)

***Figure 5.** Photomicrograph displaying fibroadipose infiltrate a) invading the porous polyethylene at 6 weeks; b) receptor area; osteoblast infiltrate (arrow). (H.E. x400)*

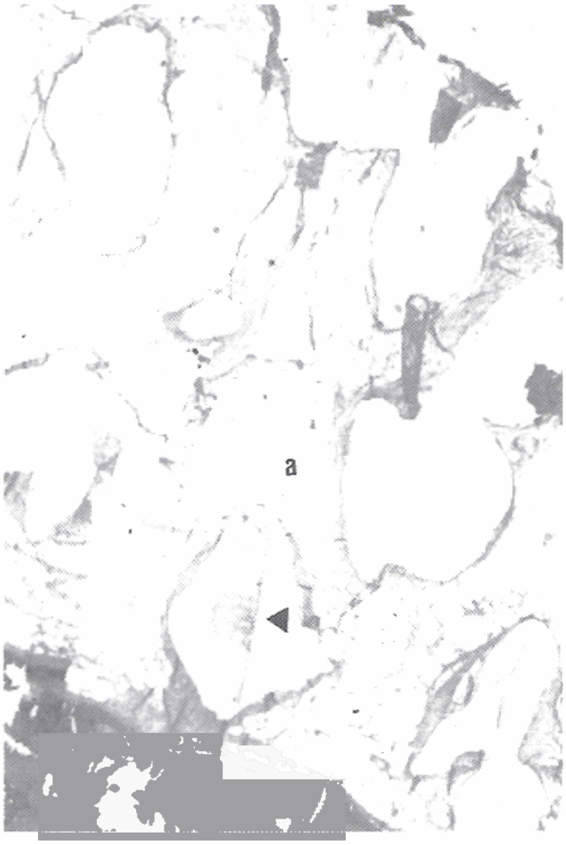
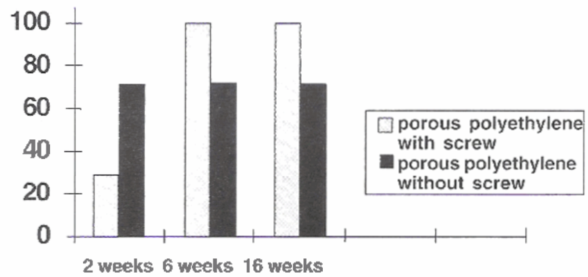
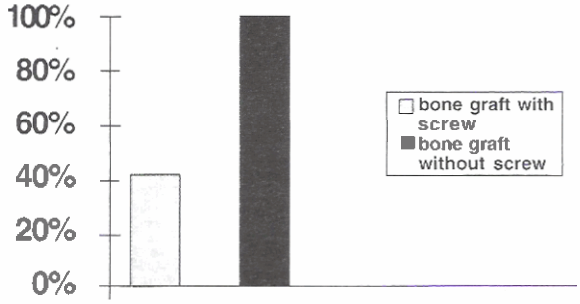


Figure 6. Photomicrograph showing adipose infiltrate (a) invading the porous polyethylene (arrow) at 16 weeks period. (b) receptor area. (H.E. x100)



***Graph 1.** Osteoblast proliferation of the PP with and without screw attachment. evaluated over 2, 6, and 16 weeks.*



***Graph 2.** Percent resorption of bone graft with and without screw fixation, evaluated 16 weeks postoperatively.*

and in two cases (28.57%) without fixation.

Bone graft - New bone formation was also noted in the majority of cases, starting from the periosteum of the receptor bed. Less bone resorption occurred in the grafts attached with screws. Two cases of severe resorption occurred in the unattached grafts with a decrease in thickness over the late period and absence of viable bone medulla (graph 2).

Clinical cases

Initially, PP implant became available for use in craniofacial reconstruction. Titanium screws secured the implant when possible, in the great majority of cases.

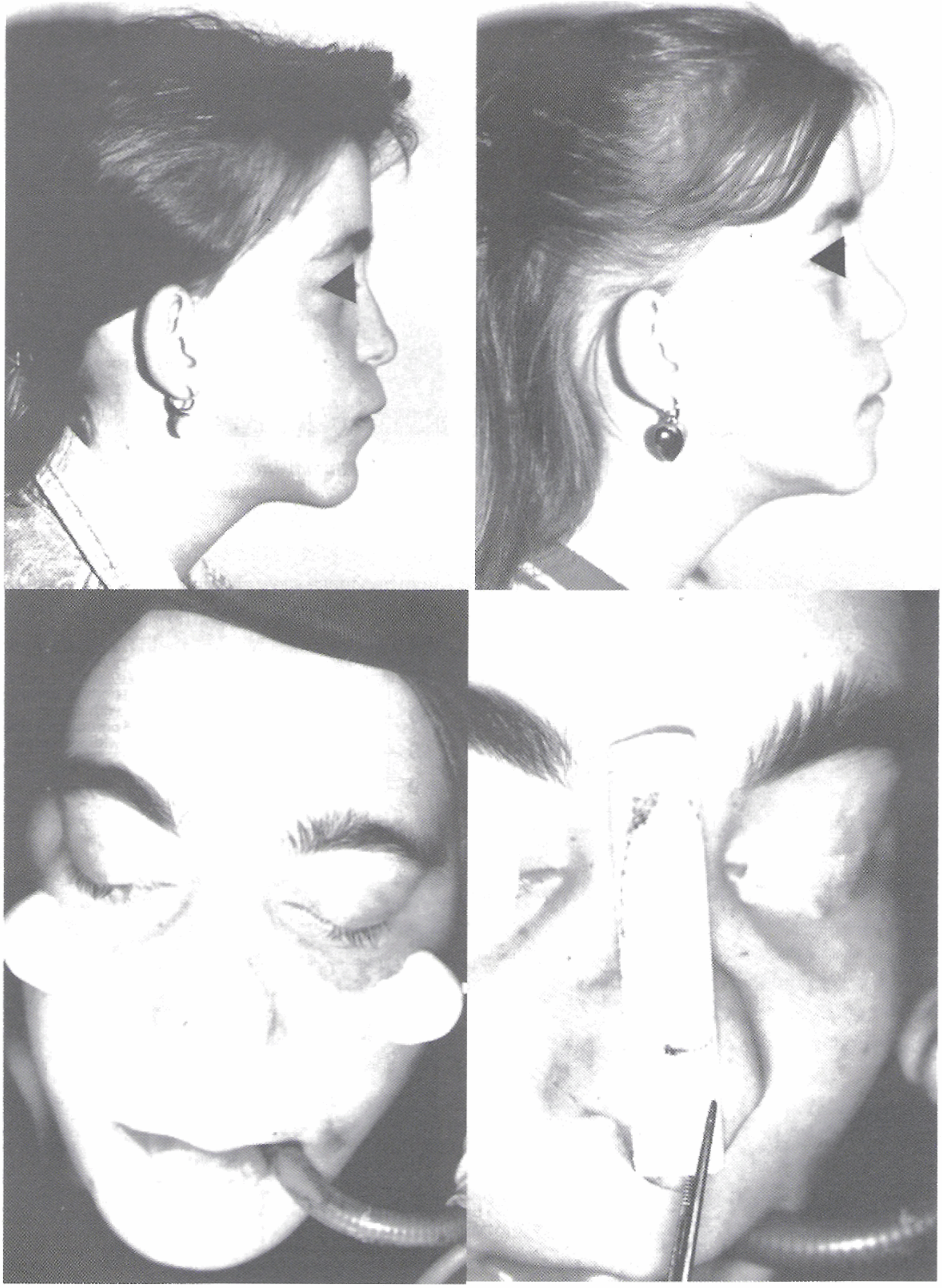


Figure 7. Preoperative and postoperative view. Patient with long concave face submitted to osteotomy of the chin, shortening of the upper lip and fixation of PP with titanium screws in the zygoma. The nasal implant was cut and shaped to the size of the nose.

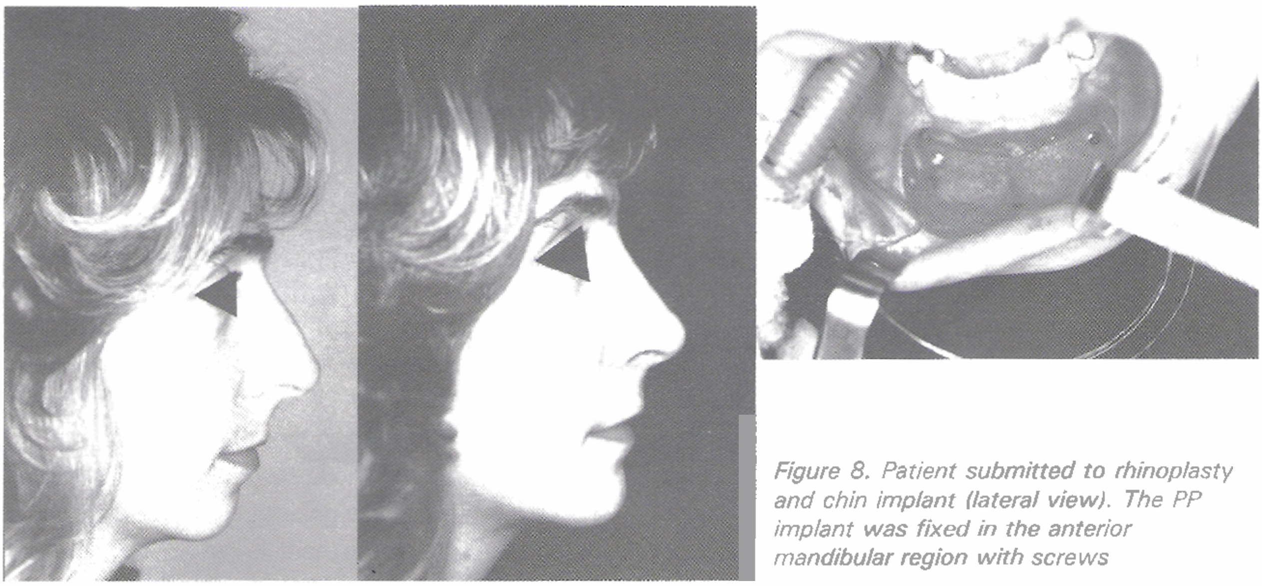
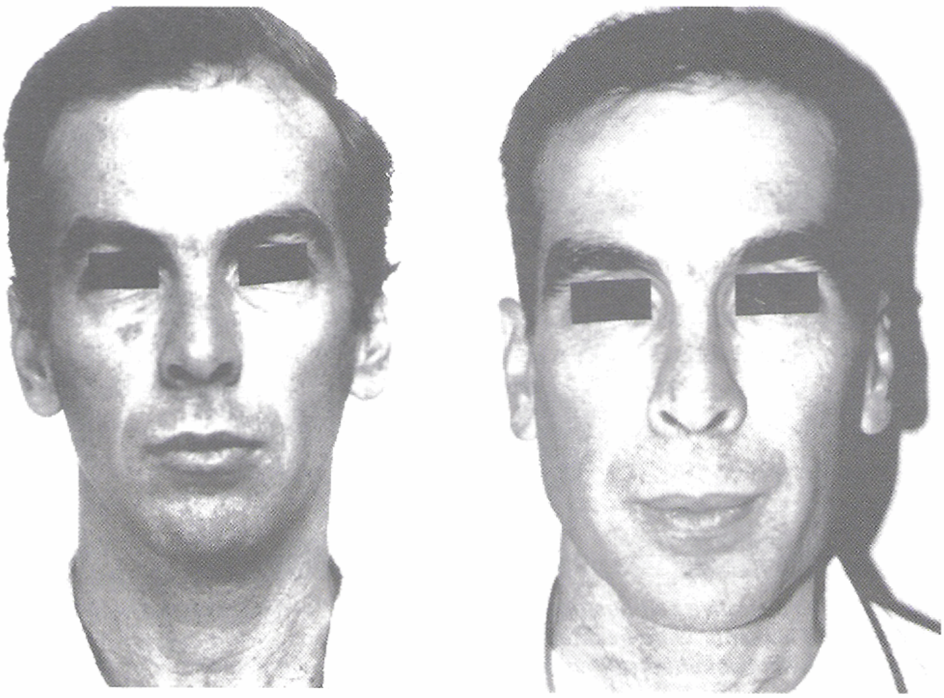


Figure 8. Patient submitted to rhinoplasty and chin implant (lateral view). The PP implant was fixed in the anterior mandibular region with screws



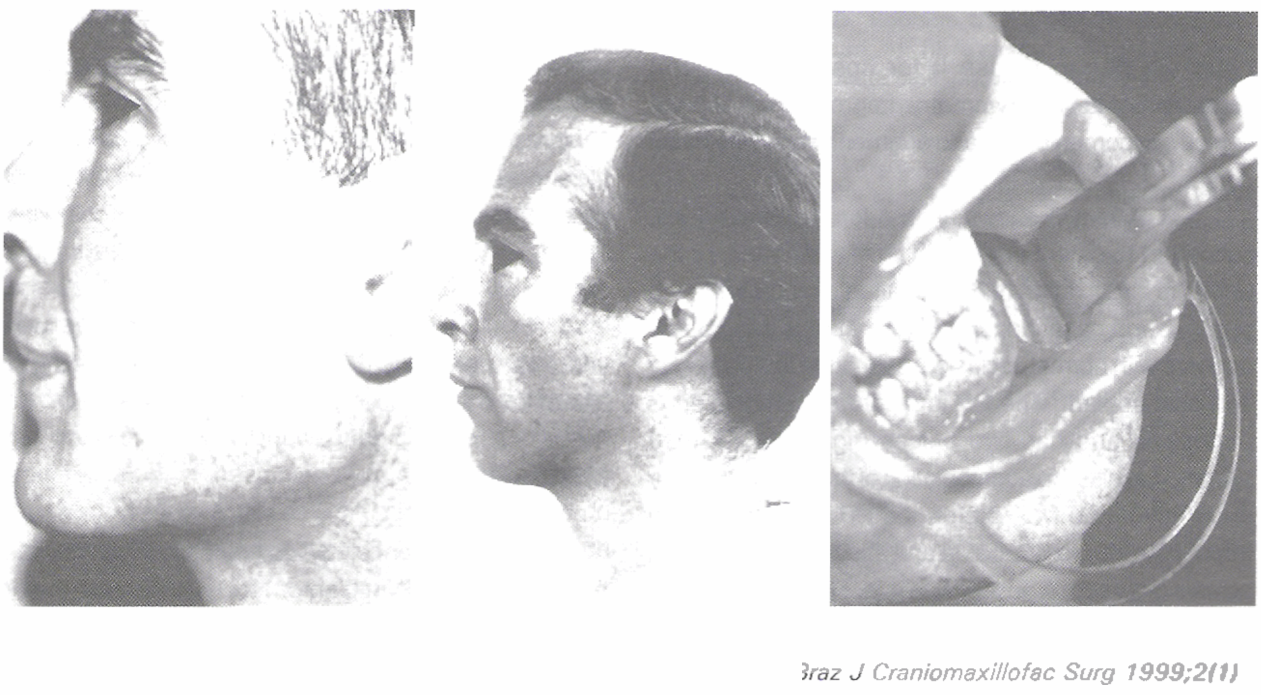


Figure 9. Patient submitted to porous polyethylene implant in the angle and body of the mandible, with rigid fixation. Frontal and lateral view. Note the improvement of mandibular contour.

Figure 10. Preoperative and postoperative appearance of patient with minor facial asymmetry. Porous polyethylene implants were inserted bilaterally in the region of the zygoma with greater projection on the left. The patient was submitted to rhinoplasty, canthoplasty, and osteotomy of the chin.

Later we began to use it for cosmetic surgery: correction of facial asymmetry; improvement of bone contour; hypomentonism and augmentation of the nasal dorsum.

A patient is shown, with a long concave face, submitted to osteotomy of the chin, shortening of the upper lip and fixation of PP with titanium screws in the zygoma and nasal dorsum (figure 7). Another patient appears with normal occlusion, submitted to rhinoplasty and chin implant. The PP implant frequently used is preformed and has two pieces (figure 8). A third patient, submitted to augmentation of the mandible (body and angle), had two preformed PP implants placed through an intra-oral incision and attached with titanium screws (figure 9). A patient with minor facial asymmetry is presented. Preformed PP implants were placed in the zygomas and fixed with titanium screws. The implants increased and corrected the difference in facial projection. In addition to rhinoplasty, the left cantal ligament was raised and osteotomy of the chin was accomplished, sliding it forward and leftward (figure 10).

In all cases, no complications occurred up to 1-year postoperatively. Clinically, there was no shifting or alteration in the shape of the implant.

DISCUSSION

In the present study, osteoblastic ingrowth was present in the PP implants. However, it was minor compared to the reports of Spector (4) and Klawitter (5). The latter observed evident ingrowth of bone tissue in the implant. Unlike the study of the aforementioned authors, in the present study the cortical bone was intact, which explains the results observed. The low rates of bone resorption of PP in the receptor area are comparable to those mentioned in the literature. Wellisz (3), in an experimental study with rabbit mandibles, noted that there was less bone resorption than methylmetacrylate and silicone 24 weeks postoperatively.

Autogenous bone grafts with rigid fixation displayed less bone resorption compared to the non-attached ones (11), agreeing with what is reported in the literature. However, there are no studies about the effect of rigid fixation on PP inclusions. In the present study, bone resorption was minor in the receptor bed, independently of whether the PP implants were fixed or not. Nevertheless, major contact with the receptor bed promoted by the screw permitted greater osteoblastic infiltration in the group with PP and rigid fixation. Clinical experience is related with chin implants, and serial cephalograms taken in five patients revealed no bone erosion or implant migration over a 1-year period (16). The sites of implantation and implant movement are essential factors in determing the nature of tissue response and fate of an implant. The PP implant with no fixation did not demonstrate the ability to consistently provide an implant that is stable on underlying bone (12).

Early and late histological analysis indicated that in no case does PP display alterations in shape and size or infection. In the group with bone grafts, intense resorption was observed in two cases in the late period, which is compatible with studies realized with autogenous bone grafts of dog ribs (12).

PP implants have a variety of applications in the facial skeleton. The clinical results of all the operated cases were satisfactory and comparable with those described in the literature (9,13). We prefer to use the preformed anatomical PP implants in regions as chin, zygoma, nose, and mandible. After this experimental study, it was decided to fix the PP implant with titanium screws. Although the fixation is performed using sutures, K-wires and screws (14), we always use titanium screws. We believe that the major bone contact promoted by rigid fixation facilitates tissue growth within the pores of the implant, besides reducing the chance of infection and exposure of the implant. Presently, correction of the nasal dorsum is the only situation in which we do not use rigid fixation, since this region is a tight envelope which prevents mobility of the implant.

Some years ago we discontinued the use of silicone in craniofacial surgeries because of the unfavorable results reported in the literature and in our series. Silicone implants are known to cause resorption of the underlying bone in the region of the chin, which varies with the size of the implant, with the pressure, with the type of material and with mobility (15,16). Our current experience with PP has enabled us to apply it in many cases of microgenia and other deformities of the facial contour, reserving osteotomies for more severe cases or those with functional involvement. Chin implantation is an easy procedure to perform and the results are good. The incision is small and it is often easier to insert the implant into two pieces (prefomed model). Nevertheless, PP should not be viewed as a bone substitute, despite its properties of osteoconduction; nor is it indicated in segmental bone losses or load-bearing regions.

CONCLUSIONS

1. The pores of the PP demonstrated tissue ingrowth in all cases. 2. Fibrovascular proliferative tissue growth was evident 2 weeks postoperatively; fibroadipose tissue was evident after 6 weeks, and adipose tissue after 16 weeks. 3. Rigid fixation promoted major osteoblast infiltration in the PP and less bone resorption in the grafts. 4. Resorption of the underlying bone was slight in all cases of PP, independently of fixation. 5. The results of the clinical cases were satisfactory at least 1 year postoperative and, without complications.

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EAGLE'S SYNDROME ASSOCIATED WITH AN ACCIDENTAL FRACTURE OF THE STYLOID PROCESS: A CASE REPORT

Eduardo Grossmann, DDS, PhD[1]; Mirian Martelete, MD, PhD[2]; Marcus V. M. Collares, MD, PhD[3]; André A. C. Puppin, DDS, PhD[4]

The authors describe and discuss the case of a patient with Eagle's Syndrome, who suffered fracture and dislocation of the styloid process after a car accident. As a result of the fracture, the patient had a positive evolution, with complete elimination of initial painful symptoms.

KEY WORDS: *Eagle's Syndrome, diagnosis, fracture.*

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Eagle's Syndrome was originally described in 1937 (1) in patients who had developed craniofacial pain after undergoing a tonsillectomy (2,3). Some of the symptoms usually described in the literature are vague facial pain (especially when swallowing, turning the head or opening the mouth), pain in the auricular region, sensation of foreign body in the throat, dysfagia, temporomandibular joint (TMJ) pain, and tinnitus. Although there are other symptoms, none of them is pathognomonic (2-7).

Eagle's Syndrome is caused by an elongation of the styloid process, or by the calcification of the stylohyoid ligament (7). Approximately 4% of the population are affected by this unusual growth (3). According to O'Carrol (8), race does not seem to be related to the development of this condition; however, it seems that the number of women affected is slightly higher than that of men. Ferrario et al. (9) reported that calcification increases with aging, but that this fact is not related to sex. Symptoms usually develop after the fourth decade of life (10), and are more frequent between 50 to 80 years of age (4). The surgical excision of the styloid process is the most widely accepted treatment; however, there are reports on remission of the symptoms after lidocaine and steroid injections in the tonsilar fossa (3, 11).

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CASE PRESENTATION

A 45-year-old white male presented with severe pain in the cervical region and left TMJ. He reported having had this pain for 2 years. Even after having been seen by a number of experts (otorhinolaryngologists, neurologists, dentists, oral surgeons), he still experienced pain.

Clinical examination revealed a 51-mm mouth opening, as well as jaw deviation to the left, without articular noise, but with pain in the left TMJ. Muscular examination revealed a painful area in the posterior portion of the temporalis muscle and in the area of the left tonsilar fossa.

The patient presented unexpected acute pain in the left auricular region, similar to an electric shock. This pain increased when he turned his head to the left. The symptoms became less evident with nonsteroidal anti-inflammatory drugs.

The panoramic, face oblique posteroanterior, and the lateral skull radiographs showed a calcification of the styloid ligament, approximately 50 mm long (figure 1). These findings confirmed the diagnosis of Eagle's Syndrome.

The initial treatment consisted of resting, soft and liquid diet, non steroidal analgesics, and muscle relaxants. The surgical excision of the styloid process would be the follow-up procedure.

When the patient returned for presurgical evaluation, he reported having had a car accident with clavicle and left arm fractures, edema and excoriation of the face, and contusion of the inferior limbs. Examination evidenced a reduction of the mouth opening to approximately 30 mm, and difficulty in chewing.

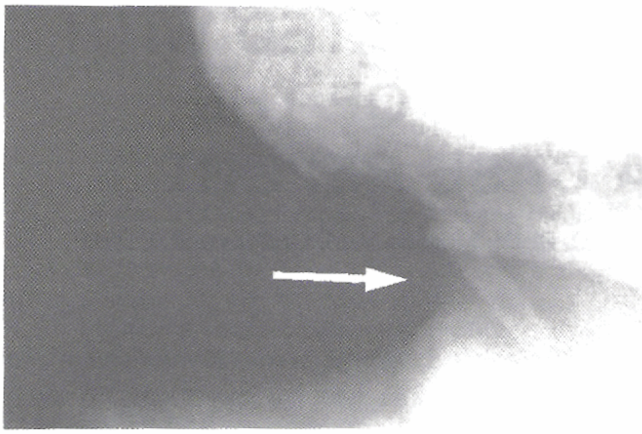

Figure 1. Calcification of the styloid ligament

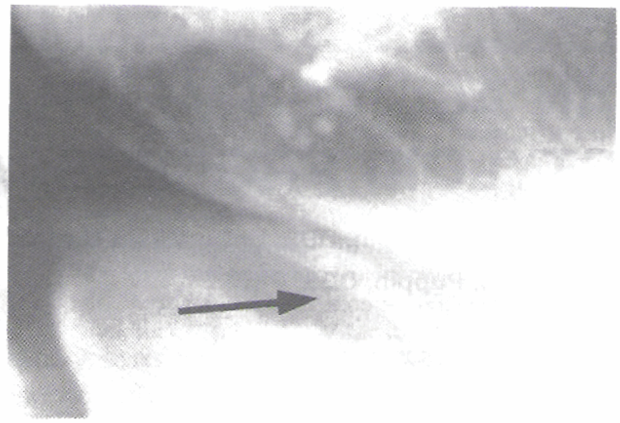

Figure 2. Fracture of the styloid process on the left side.

However, he reported total remission of the pain symptoms in the TMJ and in the left cervical region.

Radiographs taken after the car accident displayed fracture of the styloid process in the left side (figure 2). The dismissal of the surgical procedure was determined on the basis of these clinical and radiological findings. Thirty months after the accident, the patient remains without symptoms.

DISCUSSION

The diagnosis of Eagle's Syndrome is accomplished through anamnesis, and through physical and radiographic examinations. The careful palpation of the tonsilar region (12), as well as local injection of anesthetics may be used to confirm this diagnosis (11). Panoramic radiographs are very useful to establish probable alterations in the length of the styloid process. Tomographs may also be helpful to determine the exact size of the styloid process. A radiographic classification is proposed by Langlais et al. (13) to simplify the descriptions of stylohyoid complex mineralization.

The differential diagnoses for Eagle's Syndrome are geniculate neuralgia, sphenopalatine neuralgia, Ramsay Hunt's syndrome, carotidynia, temporomandibular joint pain, tonsillitis, mastoiditis, impacted third molar pain, myofascial pain, foreign matters in the pharynge, megrims, and tumors in the cervical region (7, 10).

The styloid process is a thin and long osseous projection which emerges from the tympanic portion of the temporal bone, anterior to the stylomastoid foramen. It is located deep in the pharyngeal wall, in the area of the tonsilar fossa, between the internal and external carotid arteries. Three muscles, the styloglossus, the stylohyoid and the stylopharyngeal, innervated by the hypoglossal, facial and glossopharyngeal cranial nerves, respectively, as well as the stylohyoid and the stylomandibular ligaments, originate from this process. In average, the length of the styloid process is 20 to 30 mm. Any styloid process exceeding 25 mm should be considered long (12).

A number of theories have tried to explain how this calcification process, or the mineralization of the styloid ligament, develops (2, 9). When occurring within the third or the fourth decade of life, it could be considered a congenital abnormality resulting from the persistence of the embryonic cartilage, and from its posterior calcification (4). When occurring in elderly patients, ossification could be related to aging (2). The literature reports that the most common symptoms are functional (75% of the reported cases) and related to the throat (dysphagia, a foreign body sensation in the throat, constant and dull pain in the throat). Twenty-five percent of the cases present other symptoms, such as otalgia, headache, temporomandibular joint pain, carotyd artery course pain, and facial pain (14).

In the present clinical case, diagnosis was achieved after a careful analysis of the patient's history and of clinical and radiographic findings, which were similar to some of those reported in the literature. The fact that other professionals had not been able to make an accurate diagnosis resulted in stress and anxiety for the patient, and in a sense the patient had developed a high level of distress, aggravating the symptomatology. The original treatment proposed was not carried out, since the patient suffered a car accident in which the styloid process was fractured. Up to the present moment, this incidental closed fracture has been effective in relieving the patient's pain and in contributing to his well-being.

Closed fracture has been proposed as an alternative to surgery for treatment of Eagle's Syndrome. Despite the favorable evolution of the case described by us, surgery is still the method of choice for treatment of this condition. Closed treatment does not allow adequate control of fracture site, extension, and relationship with major structures.

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SURGICAL REAPPROACH OF TEMPORAMANDIBULAR JOINT DUE TO MINIPLATE FRACTURE: A CASE REPORT

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Mandible condyle fractures are the most common fractures of the facial bones. The method of choice for treatment of these fractures — conservative or surgical — has not been established. This study describes the clinical and radiological findings in an adult patient presenting a fracture of the mandible head with anteromedial dislocation. The postoperative evolution, with fracture of the miniplate, and consequent surgical reapproach are described.

KEY WORDS: *Condyle fracture, miniplates, TMJ*

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Condyle fractures are the most common fractures of the mandible, corresponding to 25 to 35% of all cases. This is due to the fact that the condyle is the weakest region of the mandible (1-3).

Usually, the mandibular head is fractured through indirect trauma. In paralateral injuries, the mandibular fracture may be associated with a contralateral condylar fracture, while a traumatism in an opposite direction may cause fracture in both condyles (1). Clinically, the patient will show facial asymmetry and occlusive deviation towards the fractured side. In case the fracture is bilateral, the result will be an anterior open bite. When the lateral pterygoid muscle is in the fractured segment, it may affect the protusive movement (1, 4). Symptoms may include articular edema, ecchymosis, sensitivity to palpation of the joint and external additive duct. Pain is also present, and increases with mandibular movement (1, 5).

The treatment of condyle fractures is controversial, and it often results in joint disorders (1, 3, 4, 6-9). Therapeutic options should take into account the location of the fracture line, the patient's age, the degree and direction of the dislocation of the fractured fragment (relationship with the mandibular fossa), the patient's clinical conditions, associated injuries, condition of the teeth, occlusal steadiness, and the presence of foreign bodies (1, 4, 7, 9). Procedures that favor recovery in the shortest time possible should be given priority. Many times, surgery is the best option, and several methods are used for fragment fixation: osteosynthesis with steel wire, Kirschner's wire, and especially plates and screws (3, 4, 7, 8, 10-12).

The following surgical paths may be used: preauricular, submandibular, retromandibular, or intrabuccal. Trans and postoperative complications may include facial nerve injury, edema, large vessel-maxillo artery hemorrhage, lateral pterygoid muscle trauma, infection, condylar reabsorption and scars (1, 3, 4, 5, 7, 9, 10, 12, 13).

Some authors (1, 7, 9, 10, 14) recommend a conservative treatment, based on satisfactory results, reported by clinical and radiographical evolution. Thus, for those authors, surgery is indicated when there is an excessive dislocation of the head of the mandible out of the mandibular fossa (6, 10, 13). Most authors agree that conservative treatments are the best choice for children (3, 6, 9, 10).

Conservative treatment employs the maxillomandibular block with Erich's bow, and elastic traction for a period that ranges from 10 to 20 days. A physiotherapeutic period of 30 to 60 days, or until the patient has regained an appropriate mouth opening of

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40 mm, is recommended (15, 16). This procedure aims at avoiding a possible temporomandibular ankylosis (1, 7). Edentulous patients require suspensions and cerclage associated with gutter or prothesis fixation (2).

Absolute and relative indications for surgical reduction (9) appear in table 1; the choice of treatment should take the patient's age into account (table 2) (17). The most common sequelae of condylar fractures are occlusal alterations, internal disorder of the TMJ and akylosis (3, 17).

CASE REPORT

The patient is a 36-year-old brick layer. In February, 1994, he presented at a hospital in the city of Porto Alegre, reporting that he had been hit on the facial region. The diagnosis at that moment was of a right, low, condylar fracture, with anteromedial dislocation. A conservative treatment was applied, with a maxillomandibular block with Gilmer's wiring for 21 days (figure 1A). A nonsteroidal anti-inflammatory drug, sodium diclofenac (75 mg), was prescribed every 12 hours, during the first 72 hours after the trauma, along with liquid and smooth diet.

After 3 weeks the patient returned, looking for assistance. He presented a deviation of the mandibular medial line in the mouth opening, limitation in the lateral excursion to the right, and slight anterior open bite. Radiographically, the condyle was still showing dislocation in the anteromedial sense (figure 1B). Based on these data, we have opted for a surgical-anatomical procedure to reduce the fractured condyle, applying the approach described by Kaban et al. (18). Fixation was by means of a titanium miniplate and miniscrews. The patient was told to take liquid and smooth diet. A maxillomandibular postoperative block was not

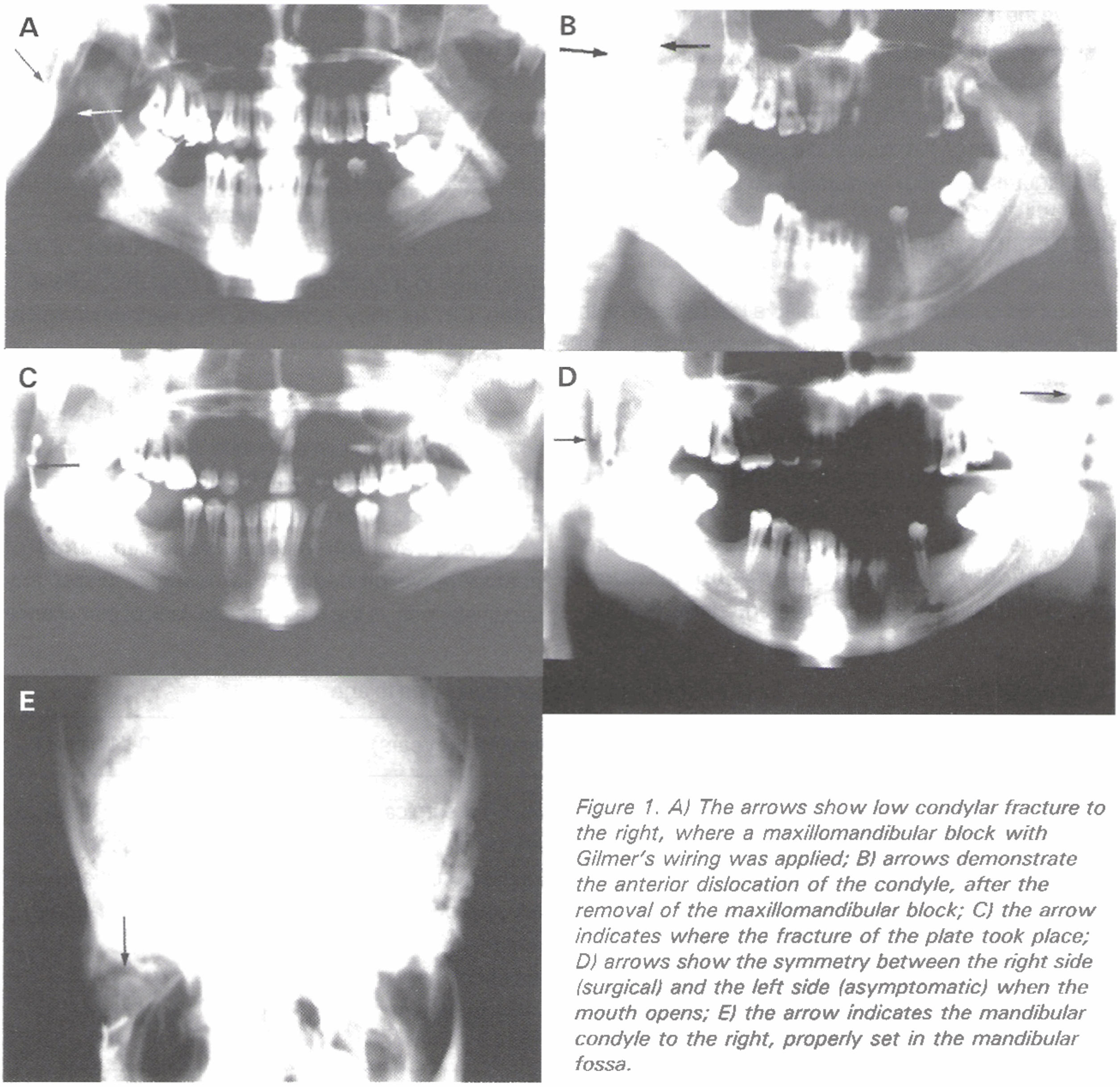

Figure 1. A) The arrows show low condylar fracture to the right, where a maxillomandibular block with Gilmer's wiring was applied; B) arrows demonstrate the anterior dislocation of the condyle, after the removal of the maxillomandibular block; C) the arrow indicates where the fracture of the plate took place; D) arrows show the symmetry between the right side (surgical) and the left side (asymptomatic) when the mouth opens; E) the arrow indicates the mandibular condyle to the right, properly set in the mandibular fossa.

Table 1. Absolute and relative indications for surgical reduction (9)

Absolute	Relative
1. Condyle dislocation into the medium cranial fossa	a. Bilateral condylar fracture, hindering the use of the maxillomandibular block, and through the atrophy of the alveolar border
2. Impossibility of achieving an appropriate occlusion by means of the conservative procedure	b.Uni or bilateral condylar fracture where the maxillomandibular block is not recommended due to medical reasons, such as alcoholism and convulsions
3. Lateral capsular dislocation of the condyle	c. Bilateral condylar fracture associated with a fracture of the middle third of face
4. Foreign body	d. Bilateral condylar fracture associated with gnathological problems

employed.

The 7-day radiographic postoperative control showed a fracture in the miniplate (picture 1C). According to the patient's report, he had included solid food in his diet during the postoperative period.

A new surgical procedure was recommended to remove the fractured plate, and to replace it for another one with similar characteristics.

After 42 months of postoperative follow-up, articular functionality is perfect, with an appropriate mouth opening of 40 mm, without deviation and without pain (figures 1D, 1E).

DISCUSSION AND CONCLUSIONS

This adult patient presented a low fracture, with anteromedial dislocation. In theses cases, the therapeutical option applied in the beginning is the one recommended by some authors (1, 7, 9, 10). However, our first evaluation, 21days after the trauma, demonstrated serious functional limitations, due to the severe dislocation of the mandibular condyle. These findings determined a conservative surgical procedure. The option for combined pre-auricular and submandibular access is justified, since the pre-auricular access offers only a very restricted surgical area for bone fixation by means of plates and screws (3).

Miniplates and miniscrews are used due to the good clinical results which may be achieved, and to the possibility of shortening or even avoiding the discomfort of the maxillomandibular block (3, 4, 8, 9, 11). Zide and Kent (9) report that the only bone fixation method that allows immediate postoperative functioning is the use of miniplates with at least two screws in the fractured fragment, and two screws in the steady fragment. The other options always allow the mandible to rotate to some extent, requiring maintenance of the block.

There are no reports on fractures of the miniplates in mandibular condyle fractures. Ellis and Dean (3), as they reviewed the various surgical accesses for condyle fracture treatment, vaguely referred to fracture of the zygomatic compression miniplates used in the treatment of condylar fractures when submitted to complete and immediate function. Those authors attribute that fact to the thinness of the plate, and recommend the use of a thicker system.

Anyway, patient observation in terms of postoperative procedures, is essential under any circumstances. In the present case, lack of compliance

Table 2. Choice of treatment according to age

Adults (+ 20 years)	Adolescents (12-19 years)	Children (0-11 years)
Conditions 1-4 = surgical reduction Severe dislocation = consider either conservative or surgical procedures/ treatment Conditions "a-d"= consider either conservative or surgical procedures All other conditions = conservative treatment	Conditions 1-4 = surgical reduction Severe dislocation = consider either conservative or surgical treatment All other conditions = conservative treatment	Conditions 1-4 = surgical reduction All other conditions = conservative treatment

(including solid food in the diet) certainly caused the fracture of the miniplate and dislocation of the fragment, resulting in a surgical reapproach. The situation became identical to that of the conservative postoperative, with limitations and possible functional sequela. As a result, a new osteosynthesis with miniplate and screws was performed.

A more strict postoperative and clinical control was associated with radiographical control immediately after the surgery and before discharge. The need for a reapproach and stricter control were enough to ensure patient compliance, resulting in a successful treatment.

The patient's cooperative attitude is the most important factor that should be taken into account when considering the choice of treatment. The maintenance of the maxillomandibular block for a few days, even in surgically treated cases, has shown to be useful for non-compliant patients. Postoperative care must be exhaustively explained and carefully emphasized.

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