IS A MODIFICATION OF KABAN’S PROTOCOL IN TREATING TEMPOROMANDIBULAR JOINT ANKYLOSIS APPROPRIATE?

To the Editor—Contemplating a recent conference where distraction osteogenesis was hotly criticized and fiercely defended during a debate, we are inspired to highlight a particular surgical indication where the philosophy of osteodistraction might offer benefits over conventional protocol. The hallmark of temporomandibular joint (TMJ) ankylosis is functional and esthetic disability. The restoration of oral opening in this condition is by osteoarthrectomy with interpositional arthroplasty using fascia of the temporalis muscle. Kaban also proposed reconstruction with a costochondral graft stabilized with fixation. This would restore the vertical height of the ramus of mandible, but the costochondral component, unlike a normal graft, would actively cause further growth of the mandible. The use of costochondral grafts has led to donor site morbidity and even failure because in a child the tendency for overgrowth of the mandible is unpredictable. TMJ prostheses have not demonstrated expected longevity or performance.

Although correction of facial asymmetry resulting from TMJ ankylosis in childhood is not completely possible with unidirectional distractors, the development of newer appliances has made multiplanar distraction possible. We envision the following application of osteodistraction instead of costochondral grafts or prostheses to reconstruct the ramus condyle unit in cases of TMJ ankylosis: a preauricular incision would give access to the ankylotic mass, permitting wide excision of unwanted bone (Fig 1A). The ramus would be osteotomized in its lowest part (Fig 1B), creating a “floating” ramus segment. A submandibular incision would be placed to osteotomize the mandible just anterior to the angle (Fig 1C). A multiplanar distractor device (Fig 2) would be fixed to these 3 osseous segments with transcutaneous pins if external or by submerging an internal device. After a suitable latency period, daily activation of the device would result in: 1) transport of the ramus segment superiorly, leading to desirable fibrocartilage formation at its leading surface and callus distraction at its trailing surface; 2) downward movement of the angle segment, normalizing ramus height, which was deficient preoperatively; and 3) “pushing forward” of the body of mandible, correcting the deviation and asymmetry of the lower face. The design of the device would permit activation of the horizontal “body arm” through intraoral access. The more vertical “ramus arm” could be activated with submandibular access, and the angulation between the 2 arms may be adjusted by a transcutaneous key.

The advantages of distraction over grafting and prostheses are elimination of donor site and hardware failure/rejection, respectively. Callus distraction at a rate of about 1 mm per day would also gently and continuously stretch the soft tissues, permitting greater and more stable expansion of the soft tissue “functional matrix,” thereby reducing relapse or failure. The distraction device provides fixation during the consolidation period. This would have the additional advantage over costochondral grafts that ultimate removal of the device would result in complete elimination of all hardware with no future “loose screws.” The use of osteodistraction to develop a neocondyle has already been elaborated by experts and tested. However, in the growing child only multiple vectors of force will correct the complex deformity caused by TMJ ankylosis. We think that simpler “straight-line” osteotomy cuts that we have described here and the use of multiple force vectors with the intention of producing a superior esthetics and function merit critical evaluation. The foreseeable risk of inferior alveolar nerve damage at both osteotomy sites may be minimized by careful sectioning of bone.

Hence, in this era of osteodistraction, the development of better distraction devices makes it possible to use growth principles highlighted in Melvin Moss’s Functional Matrix Theory. To restore ramus height, normalize occlusion, and create a pain-free, stable, and functional joint, we believe that in Kaban’s classic protocol to reconstruct the ramus-condyle unit in growing children with TMJ ankylosis, the replacement of costochondral grafting by multiplanar osteodistraction may be considered an evolution of treatment philosophy.

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FIGURE 1. Excision of ankylotic bone and placement of osteotomy cuts.

FIGURE 2. Multiplanar distractor produces 3-dimensional correction of deformity.
In reply.—I welcome the opportunity to comment on the above letter regarding the protocol for management of temporomandibular joint (TMJ) ankylosis first published in the Journal in 1990.1 In this 7-step protocol, Kaban et al emphasized a conceptual approach for surgical management of ankylosis that included 1) complete excision of the ankylosic mass; 2) ipsilateral coronoidectomy; 3) contralateral coronoidectomy when necessary to achieve complete mobility; 4) lining of the TMJ with native disc, when possible, or a temporals myofascial flap; 5) reconstruction of the ramus/condyle unit with a costochondral graft; 6) early mobilization of the jaw; and 7) aggressive physical therapy. I would like to make 2 general points in commenting on the letter.

First, the lesson of the original protocol was that the key elements for successful ankylosis release are excision of the ankylosic mass and ipsilateral or bilateral coronoidectomy to completely mobilize the joint(s). Lining of the joint and reconstruction of the ramus/condyle unit (steps 4 and 5) are important, but success can never be achieved if steps 1 through 3 are not adequately executed.

Second, the question raised in the letter is actually answered in detail in a subsequent publication,2 which was probably in press and not accessible to the authors when their letter was submitted. In this latest publication, step 5 is modified to include the use of either costochondral graft or distraction osteogenesis (DO). The concept of using DO in the setting of TMJ ankylosis is not new and has been described by other authors.3-9

Our technique10 is slightly different from that described in the letter. We do more reshaping of the transport disc to make it more “condyle-like,” and we use a unidirectional distraction device. In children with recent onset of unilateral ankylosis, the mandibular asymmetry is almost completely limited to the affected ramus/condyle unit. In those with longstanding ankylosis, the asymmetry becomes more complex and often involves the contralateral mandible and the midspace.10 In the former situation, a unidirectional device to lengthen the affected ramus is adequate. In the latter scenario, the asymmetry is complex and often requires bilateral mandibular osteotomies and possibly maxillary surgery. An operation on the affected mandible regardless of the type of distractor will not be adequate. Therefore we concentrate on correcting the ankylosis and restoring the affected ramus/condyle unit length. We deal with residual asymmetry when growth is completed. In cases of bilateral ankylosis with retrognathism and open bite, multidirectional or curvilinear distraction is indicated.

The advantages of using DO for this indication include absence of a donor site with the accompanying morbidity and the ability to start mobilization of the jaw with physical therapy immediately after the operation. Because there is less pain and only 1 operative site, the recovery is quicker and easier. However, because a growth center is not transplanted when using DO, asymmetry may continue to develop over time, in growing children, despite good motion.10

We agree with the authors of the letter that this modification is an excellent concept and an important addition to the protocol. We caution, however, that more research is required to document the long-term maintenance of jaw motion. In addition, the subsequent growth pattern in pediatric patients must be established with valid outcomes data.

In reply to a letter to the editor

To the Editor.—I mainly agree with the comments made in the letter to the editor in terms of using the buccal fat pad in the irradiated maxilla. Whenever radio-osteonecrosis is suspected, it would probably be better to plan for a larger surgical procedure and a different pedicled or free flap to achieve safe closure of the defect. I would recommend the use of the buccal fat pad in irradiated patients only for the closure of small oroantral communications if the presence of radio-osteonecrosis can be precluded by diagnostic methods before surgery. From my experience, I am not sure