EDITORIAL

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# Biodegradable osteofixation in bimaxillary orthognathic surgery

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Efficient osteofixation is essential for maintaining long-term skeletal stability in the field of orthognathic surgery. Titanium osteofixation has been considered a gold-standard protocol to ensure long-term skeletal stability. But, titanium osteofixation has some problems such as screw loosening and displacement, radiographic disturbance, and possible hypersensitivity to cold exposure. Nevertheless, the surgical concept about removal of titanium devices has changed from routine removal to leaving them in the body unless they provoke a complication. However, a titanium device is still a foreign body that some patients do not want inside their bodies. Moreover, most orthognathic patients do not want additional surgery to remove the surgical devices. Thus, biodegradable materials are needed for fixation of orthognathic osteotomies.

The idea of biodegradable plates might have emerged from absorbable sutures. The basic component is polylactic acid, which is bioengineered from sugarcane or corn starch, and is hydrolyzed with body fluids and removed completely from the body. We can use its polymerized forms due to their increased rigidity via self-reinforcement. A resorbable fixation system had been applied in orthognathic surgery since around 2000[1]. Recently, the concept has been changed from simply "resorbable" to "bioabsorbable" to include biodegradation plus stimulation of osteoconduction[2].

Most dentofacial deformities in the Korean population are asymmetrical mandibular prognathism. Mandibular setback involves more unstable movement than mandibular advancement[3]. Recently in Korea, to meet patient desire for facial esthetics, oral and maxillofacial surgeons tend to perform a more complicated maxillomandibular surgery that requires major segmental movements[4], i.e., those of greater magnitude or movements to a position of tissue resistance. Moreover, "surgery first approach" trends also result in major segmental movements in circumstances of unstable occlusal interdigitation. Consequently, many clinicians doubt the long-term skeletal stability in resorbable osteofixation for modern bimaxillary surgery.

From the author's clinical experiences, it is possible to control segments of mandibular sagittal split ramus osteotomy (SSRO) with one or two mini-sized resorbable 4-hole plates in bimaxillary orthognathic surgery[5]. But, a 2.4-mm, 6-hole poly-L/DL-lactide plate is needed to induce rigid fixation for mandibular SSRO[6]. Bioabsorbable unsintered HA/PLLA (poly-L-lactic acid) nanocomposite mesh seems to have advantages of spatial structure to ensure long-term stability after SSRO, according to the author's animal experiment (not published). Le Fort I osteotomies or segmental Le Fort I osteotomies could be stabilized with 4 mini-sized resorbable or bioabsorbable plates, which are secured in a standard position[7].

The drawbacks of using resorbable/bioabsorbable devices include higher cost, technical difficulties due to the characteristics of the material, and delayed-onset foreign-body reactions. At a later degradation stage, remaining crystal-like PLLA particles can trigger foreign-body inflammatory reactions. But, in the author's patients, this incidence was less than 1%. And the lesions occurred only in mandible, which were well controlled by routine treatments.

Biodegradable osteofixaton is popular in bimaxillary orthognathic surgery with major segmental movements. The ideal biodegradable material should rigidly support osteotomized segments during bony healing and dissolve completely without leaving irritable metabolites. Thus, there is need for an inexpensive and immunologically inert biodegradable device.

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## Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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