Autologous Rib Microtia Construction
Nagata Technique

Akira Yamada, MD, PhD

KEYWORDS

• Nagata technique • Microtia • Autogenous cartilage reconstruction • 6 types ear templates

KEY POINTS

- To achieve excellent outcomes of microtia reconstruction, all 3 keys, skin envelope, 3D framework, and proper location, must be perfect.
- Lobule split technique is the hallmark of the Nagata technique, which allows to expand skin surface area, and enables to create deeper conchal cavity.
- Six types of ear framework templates were developed by the author, based on the curve analysis of normal auricles, and these templates have been used for microtia patients in all ethnic groups.
- To master 3D cartilage framework creation, surgeons must practice intensely before starting clinical cases. For that purpose, the author's personal training method is described.

INTRODUCTION

I became Satoru Nagata's disciple in 1997, and spent 3.5 years with him.

We operated together for approximately 400 cases of autogenous rib microtia construction. Before Nagata developed his technique, autogenous rib microtia construction was a 4-stage to 6-stage procedure, and Nagata transformed it to a 2-stage total ear reconstruction. The Nagata technique is technically demanding, but the author loves this technique because of the aesthetically pleasing and sustainable outcomes. Since his landmark article in 1993, there are substantial changes in his techniques. The author modified the Nagata technique in terms of framework templates, otherwise the author tries to use Nagata's latest techniques. To achieve satisfactory, long-standing outcomes, surgeons must execute 3 key components perfectly: well-vascularized supple skin envelope, precise 3-dimensional (3D) framework, and anatomically proper ear location. In this article, the author explains how the analysis and planning of the Nagata technique is performed to achieve aesthetically pleasing autogenous rib microtia construction.

EAR LOCATION

If you carefully observe the articles/textbook chapters written by the "Giants" of ear reconstruction, such as Tanzer,[1,2] Brent,[3] and Nagata,[4–6] you may notice one thing in common. They are very careful to place a new auricle in the aesthetically pleasing location. This is often ignored by less experienced surgeons. Planning to place the new ear in the aesthetically pleasing location is actually the key to achieve successful ear reconstruction. Anatomically if you project the auricle on the facial skeleton, the auricle sits on the temporal bone, far back from the facial triangle. The auricle is located just outside of the face mask (**Fig. 1**). The auricle is at least 1 ear-length behind the lateral canthus[7,8] (**Fig. 2**). The

Disclosure Statement: Dr A. Yamada is a nonpaid consultant for KLS Martin, which is making microtia surgical instruments.
World Craniofacial Foundation, 7777 Forest Lane Suite C-616, Dallas, TX 75230, USA
E-mail address: akira.yamada@worldcf.org

Facial Plast Surg Clin N Am 26 (2018) 41–55
https://doi.org/10.1016/j.fsc.2017.09.006

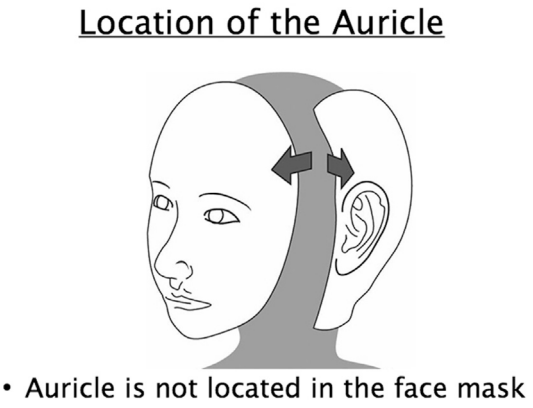

Fig. 1. Auricle is located just outside of face mask. (*Courtesy of* Toshinobu Harada, PhD, Wakayama-City, Japan.)

top of the auricle is usually at the level of the eyebrow, and the bottom of the auricle is at the level of the alar base. The auricle is tilted posteriorly 10 to 15°(s). The common mistake is to place the auricle upright, or even tilted forward, in an effort to avoid postero-lateral hairline, using preauricular skin as a part of the new auricle.

DIMENSION OF EAR SHAPE

The width of the well-proportioned ear is 50% to 55% of the length (**Fig. 3**). The Frankfurt horizontal line is located at the upper edge of tragus, and divides the auricle into upper and lower halves (see **Fig. 2**). The width of the helix is 10% of its length. The tragus must be located in the second vertical quartile from the lower end. The axis measurement is difficult to define, but 15 to 20° appears to be a satisfactory angle.[9] Some indicate the axis to be parallel to the bridge of the nose, but it is not always true for both adults and children.

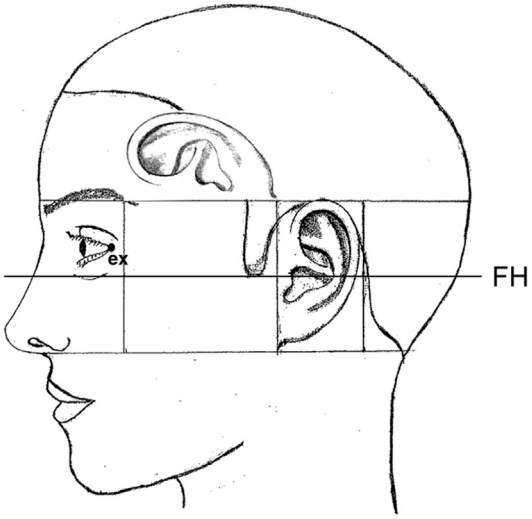

Fig. 2. The proper location of the auricle; the auricle is at least 1 ear-length behind the lateral canthus. (*Modified from* Tolleth H. Artistic anatomy, dimensions, and proportions of the external ear. Clinics in Plastic Surgery 1978;5(3)337; with permission.)

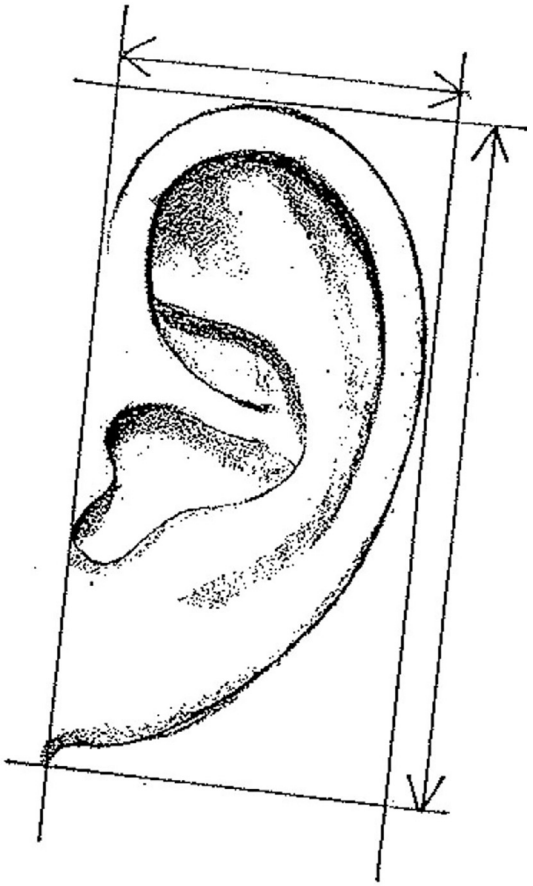

Fig. 3. The normal ratio of ear-length/width is 1 to 0.5 to 0.55. (*Modified from* Tolleth H. Artistic anatomy, dimensions, and proportions of the external ear. Clinics in Plastic Surgery 1978;5(3)337; with permission.)

EAR SHAPE ANALYSIS

Normal auricle shape is made of multiple smooth curves that include the spiral curve of the helix (**Fig. 4**). Therefore, one of the most important aspects of total auricular construction is how we create natural-looking curves in the new auricle.

Nagata uses a single ideal ear template he developed for all cases. The author used Nagata ear templates for the first 10 years, and I observed