



Microtia Repair: A Novel Application of Ultrasonic Bone Aspirator

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Abstract

Objective: Constructing an auricular framework from costal cartilage can be difficult and time consuming. The complex multi-dimensional structure, detailed contours and delicate cartilage necessitate an experienced and skilled surgeon. Moreover, knowledge and familiarity of a variety instruments may assist the surgeon and lead to shorter operative times and improved aesthetic outcomes. The purpose of this study is to describe the application of the ultrasonic bone aspirator for costal cartilage harvest and sculpting in microtia repair.

Study Design: Cadaveric study using the ultrasonic bone aspirator to sculpt costal cartilage with the Nagata microtia repair technique.

Methods: Cadaveric ribs six through nine were harvested and fashioned into an auricular framework. The ultrasonic bone aspirator was the only instrument used for sculpting of the cartilage. Several different tips were used at different portions of the procedure. Our experience was documented.

Results: The application of ultrasonic bone aspirator for microtia repair is easy, feasible and can produce an excellent auricular framework with minimal trauma to the cartilage.

Conclusions: This novel technique for contouring costal cartilage is a valuable resource in a surgeon's armamentarium when performing microtia repair.

Introduction

Microtia is the abnormal development of the external ear leading to deficits in size, shape and recognizable architecture. The exact cause of microtia is still poorly understood. Current theories hypothesize abnormal neural crest cell migration or vascular insult. Microtia has also been associated with certain teratogens and syndromes. Regardless of the cause, microtia can be a significant source of functional limitation and psychosocial burden for both the patient and their family. For advanced stages of microtia, surgical auricular reconstruction has been the preferred method of management. This has been well described by both B. Brent, MD., and S. Nagata, MD., amongst others. Surgical repair remains one of the greatest challenges for the reconstructive surgeon as it requires careful preoperative planning, surgical expertise, and artistry. There have been many surgical tools to aid the surgeon in crafting of the auricular framework including surgical scalpels, osteotomes and circular punch biopsies, each with advantages and disadvantages. We explored the use of an ultrasonic bone aspirator for both harvesting and contouring of the cartilage.

Results

The application of the ultrasonic bone aspirator for microtia repair is easy, feasible and can produce an excellent auricular framework with minimal trauma to the cartilage. There were no cartilaginous fractures during its fabrication.

Discussion

The ultrasonic bone aspirator is a commercially available surgical instrument that has been safely used in a variety of neurosurgical and ENT procedures. Overall our experience with applying it to microtia repair was favorable. We found that this instrument was easy to use and allowed for precise control while carving delicate contours. This decreases the risk of cartilage fracture and produces a more natural appearance. There were several different tips which we felt were particularly useful. The serrated knife tip was helpful in making larger, crude cuts in the harvesting and general sizing of the graft. The Paynor 360 and Spetzler micro-claw were advantageous in contouring round and flat surfaces respectively. The ring curette was particularly helpful in the creation of the triangular and scaphoid fossa. While many aspects of this procedure are surgeon dependent we feel that this tool may decrease operative times. Disadvantages to the the ultrasonic bone aspirator mostly pertain to availability and costs. We understand that a portion of microtia repair may be performed in underserved or rural areas where this technology is unavailable.

Methods and Materials

Cadaveric ribs six through nine were harvested and fashioned into a stacked auricular framework using the Nagata technique^{3,4}. The ultrasonic bone aspirator was the only instrument used for sculpting of the cartilage. Several different commercially available tips were used at different portions of the procedure. Our experience was documented.

Conclusions

The ultrasonic bone aspirator is a user friendly, feasible tool which can aid a reconstructive surgeon in the harvest and contouring of the auricular framework. While it may not always be available, this novel technique is a valuable resource in a surgeon's armamentarium when performing microtia repair.

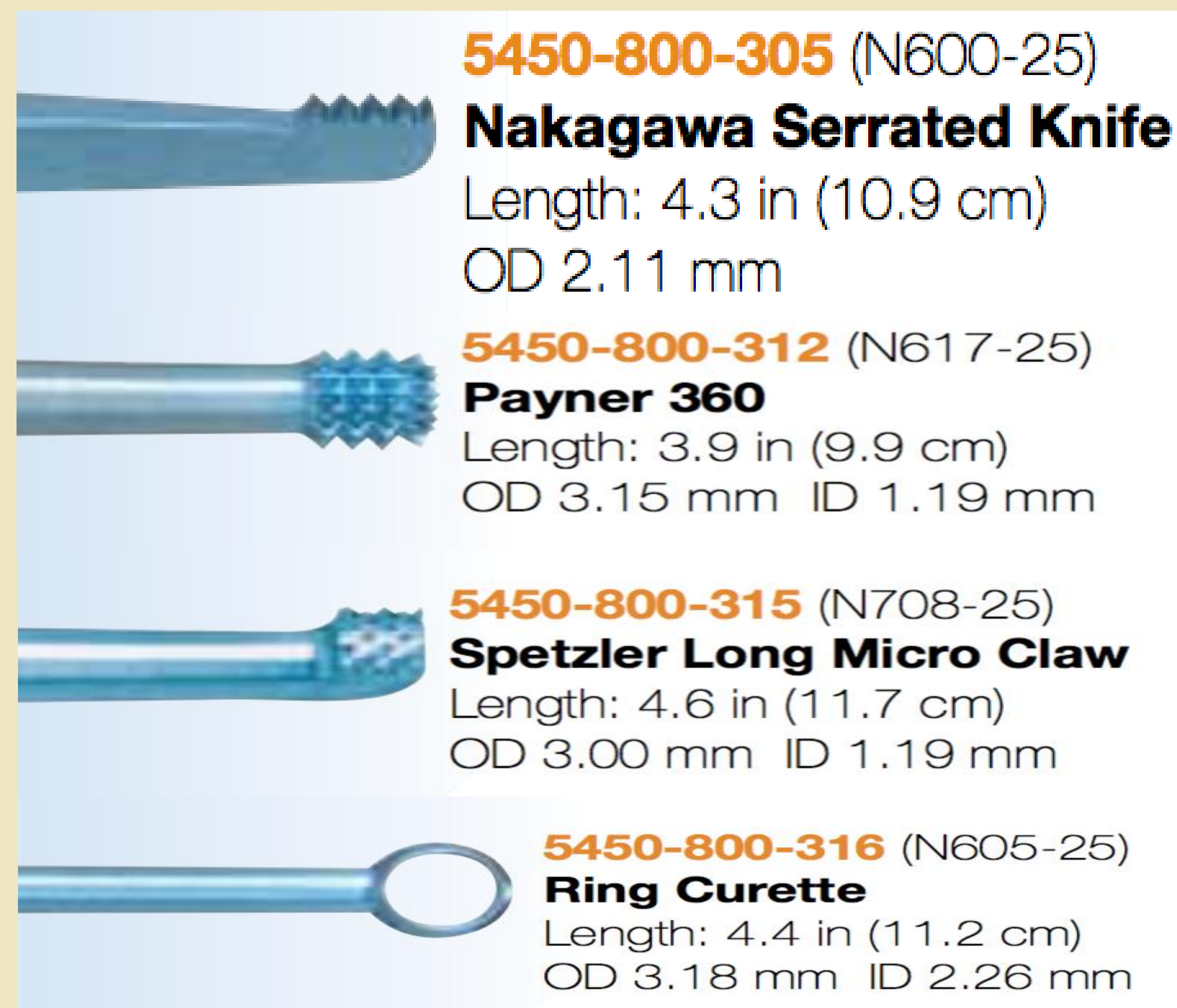


Figure 1. Sonopet® tips as described in discussion⁸

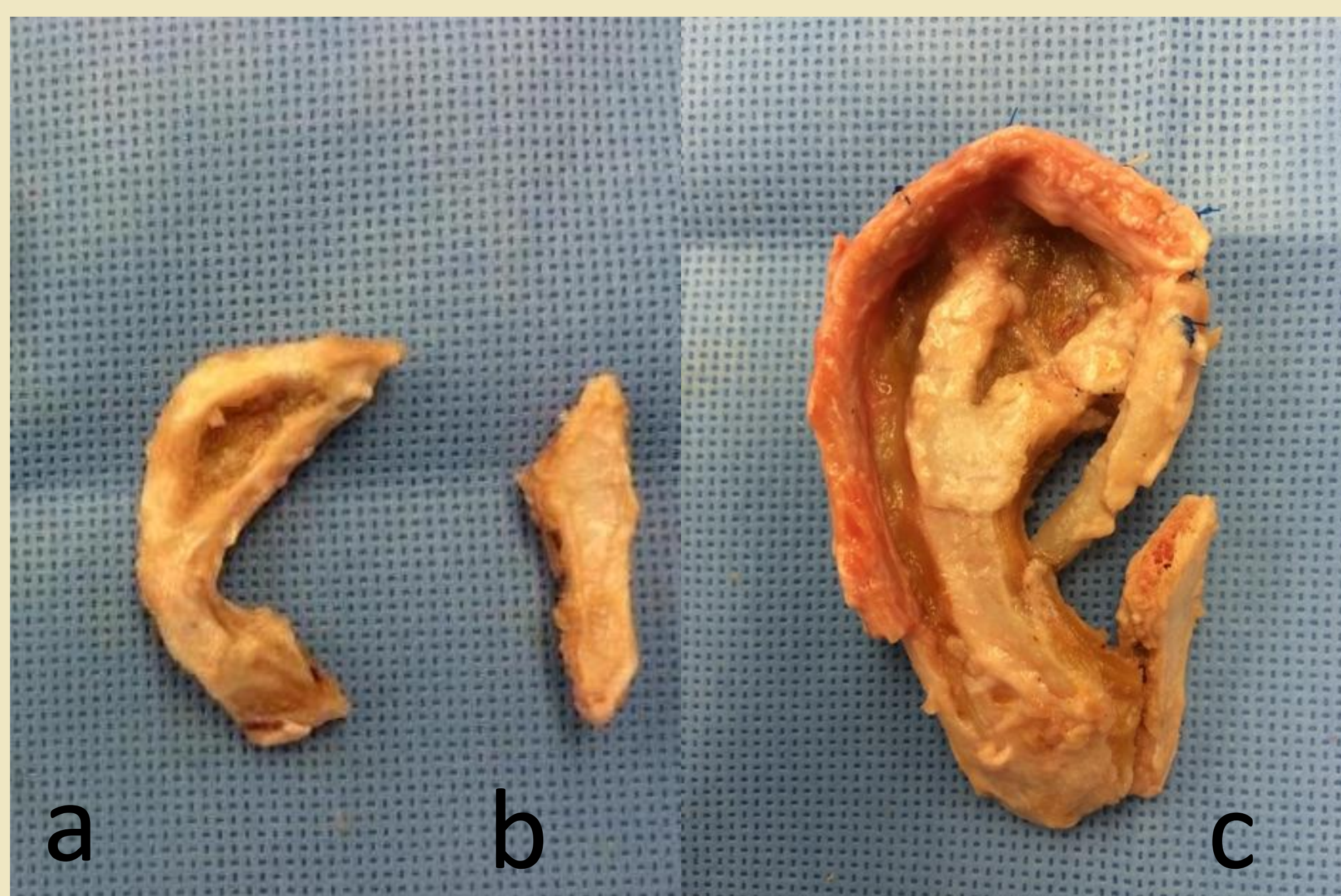


Figure 2. Cadaveric rib cartilage status post sculpting with Sonopet® . (a) conchal bowl, (b) tragus, (c) Auricle with tragus

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