

# Auricular Prostheses in Microtia



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## KEYWORDS

• Bone anchorage • Osseointegration • Titanium implant • Silicone • Ear prosthesis • Pinna

## KEY POINTS

- Modern silicones as well as osseointegrated titanium implants allow for rehabilitation of patients with microtia with an inconspicuous auricular prosthesis.
- Computer science with virtual planning and rapid prototyping is about to revolutionize the process of prosthetic auricular rehabilitation.
- The state of the art for prosthetic rehabilitation is the use of osseointegrated percutaneous implants.
- Auricular prostheses may be used as a temporary measure, a rescue procedure in failed auricular (re)construction, or as a definitive treatment option.
- Auricular prostheses are not just an alternative but also a viable treatment option for patients with microtia.

## INTRODUCTION

An auricular prosthesis is an artificial substitute for malformed, lost, or removed parts of the pinna. In the German and Scandinavian linguistic area, the word *episthesis* is preferred in order to stress that these types of prostheses are placed on top of facial skin. The art of making craniofacial prostheses is called anaplastology. Virtually all available materials, for example, porcelain, wax, rubber, and paper mache, have been used in the long history of anaplastology.<sup>1</sup> Obviously, the major drawbacks for rehabilitation with auricular prostheses were the use of inadequate material and the lack of reliable methods for retention. The breakthrough for ear prostheses came with the introduction of the modern silicones and its colorings. The movie industry had a tremendous impact on the evolution of silicones used for body masks. Silicone is flexible and keeps the body temperature. Hair and pigments can be introduced into the material. Its edges can be made so

thin as to become transparent, in such a way that the prosthesis blends into the face, which enhances the camouflage even more. Moreover, the prosthesis can be made as a mirrored replica of the opposite side and be adapted to patients' wishes. Digital color scanning of the skin complexion aids the anaplastologist in matching the skin to the coloring of the prosthesis. Computer science has reached the planning, modeling, and manufacturing of craniofacial prostheses.<sup>2</sup> Laser surface scanning, image processing of computed tomography (CT) data with virtual mirroring, and rapid prototyping with 3-dimensional printing are some of the currently used tools. Exact templates for correct implant position can be made. Molds can be printed out based on mirrored images of the healthy contralateral auricle. Therefore, not only the position of the implants and prosthesis can be optimized but also the whole process is likely to be revolutionized in the near future.

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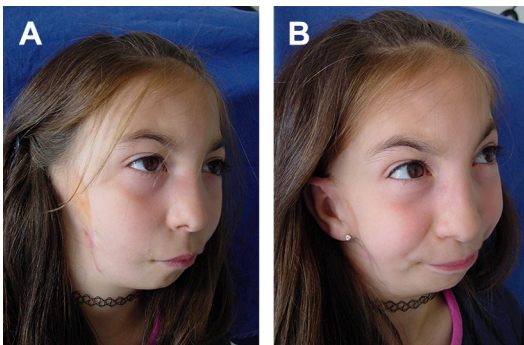
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## COUNSELING OF PATIENTS WITH MICROTIA

In general, the management of patients with existing or impending auricular defects depends to a large extent on (1) the cause of the auricular deficit with its associated factors (eg, radiotherapy in patients with cancer), (2) the age of patients, (3) the medical comorbidities, (4) the patients' ethnic and cultural background, as well as (5) psychological issues.<sup>3</sup> The prosthetic options should be discussed with patients (and parents) in a team approach with the anaplastologist, including the need for osseointegrated implants to ensure retention. Additional malformations, as in the Treacher-Collins syndrome, have to be included in the treatment plan.

Probably the most important factor in counseling is patients' age, thereby their ability for their own informed consent. Often, children develop a sense of malformation only at the 10 years of age. However, some patients with microtia without the associated malformation cope very well and do not wish to have anything done. However, puberty may change views. Definitely, counseling of these patients and their parents requires time and dedication to elaborate all of the aforementioned aspects of care. Sometimes children can be managed quite well with an adhesive-retained auricular prosthesis. This prosthesis may serve as an interim solution before any of the available options, but it also helps the child/adolescent in the process of decision-making (Figs. 1 and 2).

Implant surgery creates scars that preclude plastic reconstructive surgery with rib cartilage. Although the temporoparietal fascia flap may still



**Fig. 1.** (A) A 9-year-old girl with bilateral anotia and sequelae of complicated mandibular distraction. (B) Adhesive-retained auricular prosthesis made of silicone (anaplastologist Mathias Schneider, Zweibrücken, Germany). (From Federspil PA. The role of auricular prostheses (epitheses) in ear reconstruction. *Facial Plast Surg* 2015;31(6):627; with permission.)

be available if the superficial temporal vessels were spared, undoubtedly reconstructive surgery is much more difficult if at all possible. Therefore, the author prefers to postpone implant surgery until adolescents are mature enough to judge the consequences and risks of either surgery and are able to make the decision themselves.

On the other hand, rehabilitation with implant-retained ear prosthesis always remains an option even in the case of failed reconstruction. In the author's experience, it is best if the candidate meets a patient with an ear prosthesis in the clinic. Often, this eliminates fears of skin-penetrating implants and the artificial nature of the prosthesis. However, it also clarifies the need for implant hygiene and all aspects of life with an auricular prosthesis. Although the prosthesis has to be considered to be a foreign body, astonishingly, patients accept it as part of their body. The greatest advantage of the ear prosthesis is that it can be manufactured as a mirrored replica of the opposite side.

It is important to note that not every child with microtia needs a temporary auricular prosthesis. There are many patients who are psychologically stable and do not want any form of treatment. Careful evaluation of young patients' wishes and views is mandatory, as they may differ from those of the parents.

The medical comorbidities have to be taken into consideration: An absolute contraindication for implant surgery is severe psychiatric disease (eg, severe dementia) and bad medical condition. Poor hygiene, drug/alcohol addiction, and mild psychiatric disease are relative contraindications.

The advantages of auricular prostheses in patients with microtia are<sup>3</sup>

- Simple and fast method
- Optimal camouflage
- Predictable cosmetic result (can be shown before surgery)
- Extremely thin prosthetic edges to become transparent and blend into the face, thereby augmenting camouflage (less wear off when implants are used)
- No donor site morbidity
- Secure retention provided by osseointegrated implants

The disadvantages of auricular prostheses are<sup>3</sup>

- Prostheses are not ideal for the replacement of mobile parts of the face; in the auricular region, this plays a lesser role; however, jaw movements with the mouth opening have to be considered.

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