

## **3-D Image Application in Microtia**

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3D Medical imaging became very popular because of evolutions and increase speed in networking, computer power and software and the easy access to 3D printing technique. We can now treat our data based on desktop computer and many free open access software to generate 3D data ready for different kind of applications. By the way, reconstruction of auricle is kind of work to build up a 3D structure (organ) and its application should be intimately co-existed. Clinically we may realize that duplication of an organ same to the contralateral one is not easy even with the aid of beautiful 3D data. There are several reasons; the material we use may not be able to be processed in a freely 3D way. Or the soft tissue coverage set another barrier to complete the goal. However, we can still apply the 3D techniques to enhance our understanding and further development of surgery. In patient receives costal cartilage surgery, 3D image of costal cartilage give us idea about the size and quality of the donor site which could be helpful. It is also a good way to study and explain the outcome of the donor site happened to the patient. The 3D images of the auricle give us information about the size, skin surface estimation of the ongoing reconstructed auricle. Simulation surgery, positioning the auricle and decision making of the procedure in some difficult cases with the patient also can be done. 3D printing techniques allow us to print different kind of 3D template to guide the surgery. By apply the artificial material we may further customized the framework to make mirror image reconstruction closer. The development of computer science, 3D printing technique and biomaterial provide a field of imagination in auricle reconstruction.

## **Comparison of Autologous Tissue & Artificial Material**

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For the framework in auricular reconstruction, either autologous cartilage or artificial material has the firm supporter which may cloud our decision making. Both artificial material (Medpor) and costal cartilage are applied in auricular reconstruction in Chang Gung Memorial Hospital in order to be as possible as patient-centered decision making. The age, skin quality, size of normal auricle, chest wall condition, ear deformity type and co-morbid condition are factors which may influence the surgical procedure. Before the surgery, both techniques will be addressed and patient's decision making will be respect although bias may still exist. For example before the operation, the skin pattern will be evaluated to see if there's severe low hair line since in low hair line situation cartilage will be covered with fascia flap and skin graft which is similar to technique we used in artificial material. In some special patient's costal cartilage could not meet the requirement of surgery than will not use cartilage even the patient is grown up.

Before the surgery, the artificial implant will be prepared according to the 3D image data acquired by scanning the normal auricle, so the morphology usually is better than what we can achieved in cartilage surgery. Since limitation of fabrication will happen from time to

time in cartilage group patient while artificial material has more freedom. Artificial usually will complete in one surgery, so the time for single operation is much longer. The soft coverage is more complicated and tedious in artificial surgical group since wide fascia flap will be raised and skin graft is time consuming. Cartilage graft group the coverage is much easier but we it seems we do cannot quantitate the skin surface for coverage, this may sometimes limit our goal of the surgery.

The outcome of cartilage group patient generally shows good color and texture on the anterior surface but thicker auricle will be seen from lateral and posterior surface. Supreme result can happen in Medpor group since it can be thin and nice presentation on the posterior surface even surpass the result of cartilage.

Although exposure or fracture of Medpor may happen but resorption of cartilage may also happened so we will focus on making the surgery in a stable way instead of criticism.