CASE REPORT

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Facial epithesis on a budget. Still an option?

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Abstract
Reconstruction of postsurgical wounds, especially in the maxillofacial area, remains a difficult step for the patient´s management. In some cases, surgical reconstruction is not an option, because of various reasons, that is why for these particular cases other alternatives should be considered. Anaplastology is the medical branch that offers the possibility of reshaping the entire facial aspect. We present the case of a 54-year-old patient who lost the left eyeball due to childhood retinoblastoma surgery. Surgical reconstruction was not performed, primarily due to socioeconomic deficiencies. The stepwise method used to create an epithesis that would restore the facial symmetry is thoroughly explained. After taking the impression of the area and creating a model on the spot, successive steps followed, including eyeball creation. The purpose of this difficult procedure was to ensure the social reintegration of the patient, after years of struggling with depression. The outcome was excellent, obtaining a precise epithesis with limited resources.
Keywords: anaplastology, epithesis, reconstruction, reintegration, life quality.

Introduction

Anaplastology is a specialized branch of medicine focused on the prosthetic rehabilitation of absent, disfigured, or malformed anatomical structures in critical areas of the face and body. The term was first introduced by Walter G. Spohn, who, during World War II, was tasked with finding an alternative to traditional glass eyes, which had become increasingly scarce due to wartime shortages. As a dentist, his expertise led him to develop an acrylic alternative to glass eye prostheses. Additionally, Anna Coleman Watts established and managed a facial prosthetics laboratory dedicated to assisting war veterans [1].

Over time, anaplastology has remained a highly specialized profession combining art and medicine, influenced by various factors, including socioeconomic conditions and geopolitical stability. Global statistics indicate fluctuating numbers of practitioners and patients, largely dictated by a country's standard of living and state of peace. The most common indications for anaplastology are complex maxillofacial defects, primarily resulting from cancer, complex maxillo-facial trauma, complex head and neck reconstruction after severe infections (Necrotizing Fasciitis, Osteonecrosis) [2].

In our country, due to a lack of comprehensive statistical data on such cases, an exact number of patients receiving epithesis in the Maxillo-Facial area cannot be assessed. Although there is a lot of progress on computer based oral reconstruction, advanced post-surgical obturators with implant support which improve infinitely the quality of life [3], there is still scarce data on facial prosthesis used in our country. This is not encouraging, considering the number of patients who cannot receive major surgery for facial reconstruction, especially oncologic patients. Moreover, complex cancer treatment often has a significant number of complications which reduce the reconstruction possibilities [4].

Anaplastology comprises various aspects of prosthetic rehabilitation, extending beyond maxillofacial reconstruction to include somatic landmarks. However, facial reconstruction remains the most impactful in terms of both physical and psychological recovery [2].

The role of an anaplastologist should not be regarded as an individual one. Successful outcomes rely on continuous interdisciplinary collaboration. The guidance and recommendations of the attending physician or surgeon are essential for optimizing clinical results [5]. Their medical expertise ensures minimal complications and prevents

unnecessary delays in the manufacturing process [6].

This research presents a case of facial reconstruction using an epithesis fabricated through conventional methods in the private dental office. Informed consent of the patient was obtained.

Case presentation

We present the case of a 54-year-old male patient, who required enucleation of the left eyeball in early childhood due to a malignant tumor—retinoblastoma (Fig. 1). At the time, socioeconomic constraints prevented any reconstructive intervention. His main objective was to reintegrate into society and restore his quality of life. Consequently, a comprehensive prosthetic rehabilitation plan was devised to restore both function and aesthetics.

Figure 1. Aspect of the defect

The procedural steps were as follows:

1. **Impression**

Similar to dental procedures, obtaining an accurate working model required taking an impression using dental alginate (Fig. 2a, b). To prevent skin adherence and ensure easy removal, the patient's skin surface was pre-treated with cosmetic petroleum jelly.

2. **Impression tray**

To maintain dimensional accuracy and volumetric stability, a Class III gypsum cast was immediately fabricated on-site. This ensured that the impression retained its precise anatomical parameters.

3. **Working model**

Upon confirming the accuracy of the impression, a working model was created using Type III hard gypsum (Fig. 2c). This material was specifically chosen for its resistance to fractures and ability to preserve fine anatomical details, reducing the risk of deformation compared to lower-grade gypsum.

The gypsum model replicates all the key anatomical features required for formulating

the treatment plan in coordination with the surgeon. During the casting process, we recognized the importance of obtaining an accurate and detailed impression. The boundaries of the future prosthesis were marked on the model's surface to outline the preparation edges as precisely as possible. We also considered the need for both tissue reconstruction and additional surface areas to ensure proper positioning and secure retention of the prosthesis.

4. Wax model

In the next phase, a wax model was created to replicate the contralateral side in a mirrored view (i.e., the right side was used to replicate the absent left side). Since the silicone manufacturer, which would be used to create the skin layer, recommended optimal stability and tear resistance for thicknesses greater than 1 mm, a wax plate with a thickness of 1 mm was used as a reference for height during the creation of the duplicate model. This plate served as a foundation over which all the missing anatomical elements were subsequently sculpted. The results of the model fabrication were satisfactory, with the external anatomical details accurately reflecting specific skin textures, such as wrinkles and folds, which contributed to the individuality of the final model. (Fig. 2d)

5. Making of the mold

After creating the duplicate model, we proceeded to the next phase of mold fabrication. The goal was to create a "mother mold" that would allow for the casting of the eyelid prosthesis (Fig. 3a). To achieve this, we used the gypsum model as part of the mold, as it accurately replicated the prosthetic field, eliminating the need for a new impression. A three-part mold was constructed, designed to assemble like a puzzle, with each section fitting into place using locator nozzles (Fig. 3b). The joints between the components were sealed with wax to prevent any excess material from appearing as unwanted threads. The completed mold was then used for pouring the prosthetic silicone.

6. Testing the rigidity and texture of silicone

Selecting the appropriate prosthetic silicone proved to be a challenging process, involving numerous trials, some of which were more successful than others. The silicone material consists of two intermixable components in equal proportions. It is transparent in color, and its hardness can vary. After extensive testing, we reached the following conclusions regarding rigidity:

For most of the skin surface, we used silicone A05, as it is the softest and most accurately replicates human skin. This silicone is also stable, allowing for precise reproduction of the fine details created in wax. For areas requiring close adaptation to the prosthetic field, we used silicone A25, which is firmer and maintains its volume, a crucial property for the final prosthesis, as the patient is expected to insert and remove it frequently.

7. Casting for the eyelid prosthesis

The silicone was poured into the mold based on established principles of dental technique, utilizing the three-part mold (Fig. 3c). The section designed to adapt to the prosthetic field was filled with silicone A25, as described earlier. For the surface layer, silicone A05 was used. The two materials seamlessly overlapped due to their compatibility.

8. Fabrication of the Prosthesis

The fabrication of the eye prosthesis begins with the anatomical design plan of the eyeball. In this case, a traditional impression was not necessary. Instead, we started by creating a wax lens, which was subsequently pressed into acrylic using a standard prosthetic dental cuvette (Fig. 4a). The lens was made from transparent orthodontic acrylic to facilitate the placement of subsequent components.

The lens serves as the base for the sclera. After forming the scleral base, the rest of the prosthesis was fabricated from acrylic. The iris was initially created with a black background, which was then painted with organic pigments to match the natural color of the patient's eye. Following the painting process, the bulb chamber lens was positioned over the iris. The result closely resembled the natural eye (Fig. 4b).

Since both components were made from the same type of acrylic, they were compatible during the manufacturing process and could be assembled without issues.

The precise positioning of the iris on the scleral surface was performed with the patient present. The silicone prosthesis was placed on

the patient's face, and the transparent lens was inserted into the specially created socket for the prosthetic eye. The position of the patient's healthy eye, particularly at rest, was noted to determine the correct gaze alignment. Based on these observations, the center of the pupil was marked on the lens. Using initial measurements, the lens edges naturally aligned in the correct position.

After determining the pupil position, iris size, and overall alignment, the next step involved blending the prosthetic elements by adding the final scleral layer. Finally, fine details were added to both components of the prosthesis to ensure the closest possible match to the contralateral eye (Fig. 4c) (Fig. 5a,b).

Results:

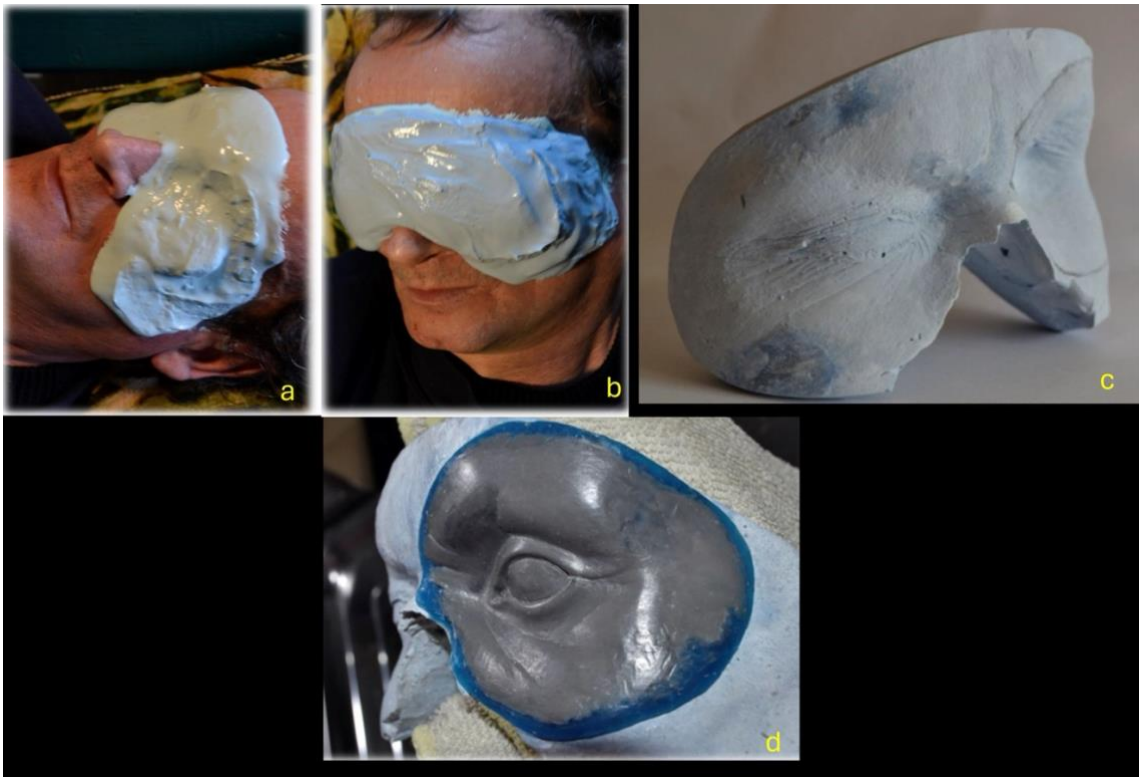

Figure 2. a, b- Initial impression; c- Working model; d- Wax model

Figure 3. a- Mother mold; b-Cast for silicone puring; c- Silicone mold

Figure 4. a- Lens creation; b-Iris and pupil design; c-Final preparation of the epithesis

Figure 5. a,b- Final aspect of the restoration

Discussions

Anaplastology is a medical field that combines medical knowledge with artistic skill. Unfortunately, this treatment option, along with the manufacturing process, is not widely recommended or used in our country, perhaps due to the absence of an established association like the American Anaplastology Association. To the best of our knowledge, there are only two specialized centers in Romania—located in Timişoara and Bucharest—that focus on the creation and production of facial epitheses. Furthermore, although some research initiatives have been supported through university funding, the cost of facial prostheses is not covered by the Romanian healthcare system [7].

Facial defect reconstruction can be achieved either through surgical procedures or by creating and adapting prosthetic devices, known as epithesis [8]. The patient's overall health must be considered, as surgery is complex and requires a relatively healthy individual. Patients who are not ideal candidates for extensive surgery can benefit from this alternative approach. Furthermore, because we are referring to complex interventions usually needed in cancer management there are several patients who refuse such invasive treatments. In case of

extended tumors, the main concern is the surgical reconstruction which requires locoregional flaps or even microsurgical reconstruction from distant regions, interventions that imply more invasive procedures which cannot be performed on frail patients. Moreover, even if microvascular techniques offer a functional surgical option, there are a lot of possible complications regarding prolonged healing, flap necrosis, and infections which are very difficult to manage [9]. Epithesis can significantly improve the patient's appearance and facilitate social reintegration [10].

The aim of this case is to emphasize the importance of this field and raise awareness among authorities about the need to establish a formal association. In this technological era, driven by artificial intelligence, we believe that such devices could be produced on a larger scale with better results using modern techniques. However, we also wanted to demonstrate that, in some cases, restoring hope can be relatively simple. Some authors use implants to secure the epithesis, but this increases the cost of the final prosthesis [11]. Financial considerations were also a factor preventing the patient from undergoing reconstruction until now.

Using traditional methods instead of facial scanning has the disadvantage of requiring a bilateral impression, which includes the healthy side, and that can cause discomfort for the patient. Also, manual conformation and manufacturing process is of course more time consuming. While some authors have had great success with digital facial scanning, the technical skill and artistic ability of the anaplastologist remain crucial [12,13]. In our case, access to cutting-edge technology is not always available, which highlights the need to reinvent traditional techniques, as they form the foundation of current practices. If intensive and specific training is assured, esthetic results can be obtained even when using conventional methods. Moreover, we also want to emphasize that interdisciplinary collaboration is of utmost importance when choosing this type of treatment option [14].

Because of the desire and the necessity to ensure a better quality of life for patients suffering from various important facial defects, modern medicine continues to improve through scientific and technological advancements. In our country remarkable results are obtained in intraoral reconstruction [15], but also endoprosthetic reconstructive surgery, still, for many patients for whom reconstructive possibilities are limited or impossible, facial epithesis could be a cost-effective option [16] .

Future development of this branch is essential, given the current historical context (as of 2025), we must acknowledge the ongoing war in Ukraine, which has persisted for two years near our country. No armed conflict has ever left both the civilian population and the military unaffected, this, being the initial reason for the development of Anaplastology as a formal profession in the United States. Future war veterans will inevitably require prosthetic rehabilitation, making anaplastology a crucial component of their social reintegration [17].

Although the patient was satisfied with the final esthetic appearance and stability of the epithesis, perhaps a better option would be, as a recent study shows, creating a facial prosthesis using four-dimensional expression models which would assure a better marginal sealing of the epithesis. This would increase the comfort of the patient, but requires additional steps, requiring scanning of different expressions and transferring the results on morphing prosthesis [18].

Conclusion

Any epithesis is a work of art, whose beauty depends on the artistic qualities of the anaplastologist in rendering the elements individually.

In addition, given the fact that there are few professionals trained in this field, it would be a great opportunity for us to be the foundation for future noninvasive facial reconstructions, creating a patient-centered methodology to improve treatment and social reintegration.

Conflict of Interest: None to declare.

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