

Prosthetic Rehabilitation of Customized Stock Eye Prosthesis Using Simplified Technique.

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Abstract:

Ocular defects resulting from trauma or surgical interventions present significant clinical challenges with profound psychological implications for patients. This case report documents the successful prosthetic rehabilitation of a 24-year-old patient who presented with an enucleated eye socket following trauma 10 years prior, which had resulted in diminished self-confidence and social functioning. The rehabilitation process involved a systematic approach beginning with primary diagnostic impressions using irreversible hydrocolloid material, followed by fabrication of a customized impression tray using PMMA with an integrated syringe handle for easy retrieval, and a detailed functional impression obtained using polyvinyl siloxane material while the patient performed various eye movements to ensure dynamic compatibility. The prosthesis was fabricated using clear heat-cure PMMA with meticulous attention to iris placement and scleral characterization using the paint-on technique, resulting in excellent retention, stability, and aesthetic outcomes that closely matched the patient's contralateral eye. Post-insertion care included comprehensive patient education on prosthesis maintenance, cleaning protocols, and prescribed eyelid exercises to improve muscle tonicity, with follow-up evaluations revealing significant improvement in the patient's psychological well-being and social confidence. This case demonstrates that custom ocular prostheses, when fabricated using precise impression techniques and detailed characterization methods, provide superior functional and aesthetic outcomes compared to stock alternatives, offering a predictable approach for ocular rehabilitation that emphasizes the importance of individualized prosthetic solutions addressing both anatomical restoration and psychological adjustment in patients with acquired ocular defects.

Keywords: Ocular prosthesis, customized prosthesis, impression techniques, acrylic eyes, maxillofacial prosthesis

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I. Introduction:

Ocular defects resulting from trauma or surgical interventions represent a significant clinical challenge with profound psychological implications. Such defects, ranging from enucleation (removal of the eyeball while preserving orbital tissues) to exenteration (complete removal of orbital contents including the eye), frequently lead to substantial psychological distress, social isolation, and diminished quality of life¹. Patients often experience altered self-perception, reduced self-esteem, and anxiety regarding social interactions following these procedures.

Custom ocular prostheses offer a vital rehabilitation option for these patients. When meticulously designed and fabricated to match the patient's remaining eye and facial features, these prostheses can significantly mitigate psychological distress and facilitate social reintegration¹.

This case report documents the rehabilitation of customized ocular prosthesis of a patient with acquired enucleated ocular defect resulting from trauma, highlighting the multidisciplinary approach required for successful prosthetic intervention and the subsequent improvement in the patient's psychosocial functioning and quality of life.

II. Case Report:

A 24-year-old patient reported to the department of prosthodontics with the chief complain of enucleated eye socket (figure 1), presenting with the history of trauma 10 years back which led to the removal of patient's eye leading to diminished self-confidence and unappealing appearance. On examination the socket was free of active inflammation, stump was mobile, and there was no need for further surgery (figure 1). Patient was informed

about the steps in detail, cost, limitations and scope of prosthetic eye for which he opted for custom eye prosthesis and written consent was obtained from the patient before proceeding with the treatment.

Procedure:

To reduce the incidence of inflammation and improved adaptation as well as retention customized ocular prosthesis was chosen, after examining the defect site for any inflammation, mobility and tissue bed primary diagnostic impression was taken using irreversible hydrocolloid material later to which diagnostic model was poured for the fabrication of customized impression tray. The customized impression tray was fabricated using PMMA to which 5 ml syringe was attached in the center of the tray to act as an anchor for the handle to retrieve it easily (figure 2) after the impression².



Figure 1



Figure 2

It was noted to make holes in the customized tray for proper retention of the impression material towards the tray without compressing the tissue bed. The tray try-in was done on the patient to check for any extensions or discomfort².

Polyvinyl siloxane being the material of choice² as it records the details more efficiently and has excellent elastic recovery as well as working time. Ocular defect was cleaned off using saline so as to get rid of any eye discharge. Petroleum jelly was applied to eyelashes to prevent any entangled impression material once set. Injecting the impression material (light body) onto the tray, it was placed into the socket, noting the position of the patient to be upright, patient was asked to do the functional movement of the eye: open, close, sideways, upward & downward gaze. This was repeated 2-3 times to obtain functional impression of the eye. After the material was set, eyelids were pulled gently to free the impression, holding the handle of the tray it was removed slowly from the socket. Impression was examined for any bubbles, perforations and extensions.

After disinfecting the impression using 2% glutaraldehyde, type IV plaster was poured on lower part of the flask and impression was placed over it before the stone set. After setting handle was removed from the tray and impression was removed, a wax try-in was made using the carving wax and try-in was done by placing it in the defect (figure 3) to check for comfort during



Figure 3

functional movements and extensions, placing the wax try-in on the lower flask mold separating media was applied on the lower half of the mold, upper half of the flask placed and dental stone was poured on the remaining half of the flask; after setting the flask dewaxing was done (figure 4). Post to dewaxing clear heat cure PMMA was mixed according to the manufacturer's recommendation, once the dough stage was attained PMMA was packed into the mold & bench-packed under pressure at 2 psi. excess was removed and repacked². Curing was done according to manufacturer's recommendation. Upon the completion of curing, excess was trimmed and polished using the polishing burs.



Figure 4



Figure 5

Upon obtaining this conformer prosthesis, try in was done by asking the patient to do functional movements of the eye, after examining the contour and size of the conformer prosthesis iris selection and shade selection was done in the same visit (figure 5). With the help of paint-on technique iris placement and characterization of the sclera was done, monopoly syrup was applied on the conformer to fix the iris and characterization (figure 5). It was repacked and cured for the final curing, under 2 psi. after curing prosthesis was checked for any roughness and small ledges followed by final polishing². (figure 6)



Figure 6

By pulling the eyelids gently, the prosthesis was placed into the socket and patient was asked to do functional movements to check for retention, stability and extension of the prosthesis. Post insertion instruction to the patient were given and follow up was recommended up to 1 week, 1 month, 3 months and 6 months and then on yearly basis.

Prosthesis Care and Management

The patient was instructed to wear the prosthesis at all times when possible. Before wearing the prosthesis, the patient was advised to clean it with water and mild soap at least 2-3 times per day³.

The patient was informed that sleeping with the prosthesis was acceptable, provided both the prosthesis and tissue bed were thoroughly cleaned. The patient was cautioned that if increased eye discharge or erythema of the tissue bed occurred, they should discontinue wearing the prosthesis while sleeping and consult promptly.

The patient was instructed to seek clinical consultation immediately if any discomfort or roughness of the prosthesis was noticed. The use of alcohol or strong solvents for cleaning was contraindicated.

Regular eye exercises were prescribed to improve eyelid muscle tonicity. The patient was taught to gently stretch the temporal areas of the lower eyelid using their index finger or thumb, hold the stretched position for 5 seconds, and then release. These stretching exercises were recommended for 5 minutes twice daily, preferably in the morning and evening. The purpose of these exercises was to enhance lower eyelid muscle tonicity to better support the prosthesis weight and potentially reduce eyelid sagging^{3,4}.

III. Discussion:

The rehabilitation of patients with ocular defects presents unique challenges that extend beyond mere anatomical restoration. This case report demonstrates the successful fabrication and implementation of a custom ocular prosthesis for a young adult patient with an enucleated socket resulting from trauma, with particular emphasis on both functional and psychological outcomes.

Custom ocular prostheses offer several advantages over stock prostheses. In this case, the precise impression technique using polyvinyl siloxane allowed for accurate registration of the socket's anatomical contours, resulting in optimal tissue adaptation⁵. The functional impression technique, which incorporated various eye movements during the impression phase, ensured dynamic compatibility with the remaining orbital tissues⁷.

The paint-on technique for iris placement and scleral characterization facilitated exceptional aesthetic outcomes. The meticulous color matching and detailing of vascular patterns provided natural-appearing results that significantly contributed to the patient's psychological adjustment.

During follow-up evaluations, the patient reported significant improvement. This outcome underscores the importance of individualized prosthetic solutions that address both anatomical and psychological aspects of ocular defects⁶. Cost-effectiveness remains a consideration in custom prosthesis fabrication. While the initial investment exceeds that of stock alternatives, the improved fit, comfort, and aesthetic outcomes potentially reduce long-term complications and associated healthcare costs.

IV. Conclusion:

This case report illustrates the successful rehabilitation of an acquired ocular defect using a meticulously fabricated custom ocular prosthesis. The technique described offers a predictable and effective approach for restoring both function and aesthetics in patients with enucleated sockets. The functional impression technique, combined with detailed characterization of the prosthesis, resulted in optimal adaptation to the tissue bed and natural appearance⁸.

Regular follow-up and maintenance protocols are essential for long-term success, with particular attention to the eyelid exercises that may prevent common complications. Future research should focus on longitudinal evaluation of custom ocular prostheses, with emphasis on quantitative measures of psychological improvement and potential modifications to enhance longevity and comfort⁶.

In conclusion, custom ocular prostheses represent a viable and effective rehabilitation option for patients with ocular defects, offering superior outcomes in terms of fit, aesthetics, and psychological impact when compared to conventional alternatives. The combination of precise impression techniques, meticulous characterization, and comprehensive aftercare provides a foundation for successful long-term rehabilitation and improved quality of life for these patients.

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