

Evaluation of Multistage Oral Mucosal Grafting From Single Donor Site in Reconstruction of Severely Contracted Ocular Socket

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ABSTRACT

Background: Management of severely contracted ocular socket with inability to retain ocular prosthesis is one of the most difficult problems to tackle. This study aimed to evaluate feasibility, cosmetic outcome and donor site complications of multistage Mucous Membrane Grafting (MMG) from single donor site.

Methods: In this prospective, non-randomized study, 07 patients with severely contracted ocular socket (grade 3-5 Gopal Krishna classification) underwent repair with oral MMG in multiple stages under general anaesthesia. Graft harvested from single donor site from inner aspect of lower lip at every surgery. Subsequent surgery was done 08 weeks later after healing of donor site and reassessment of residual socket contraction. All patients were given customised ocular prosthesis. Patients evaluated for ability to retain the prosthesis and cosmetic outcome.

Results: Mean age of patients was 43.5 years. Majority of patients were grade 4 socket contraction. Majority required 2 stages of MMG surgery. While 2 patient required 3 stages of MMG. One patient with grade 5 contraction unable to achieve satisfactory retention of prosthesis even after 3 stages of MMG. Rest all patients had adequate expansion of surface and were able to retain customised ocular prosthesis with satisfactory cosmetic outcome. No patient developed donor site infection or contracture.

Conclusion: MMG from single donor site in multiple stages for repair of severely contracted ocular socket is effective technique in terms of ease of surgery, cost effectiveness, ability to retain prosthesis and cosmetic outcome.

Key words: contracted socket, mucous membrane graft, buccal mucosa, ocular prosthesis

INTRODUCTION

In this present world driven by social media and 'selfies', presence of a cosmetic disfigurement can lead to severe psychological stress and may limit social interaction in affected person. Loss of an eyeball either due to trauma or surgical interventions like enucleation or evisceration can affect patient psyche and self-confidence.¹ An oculoplastic surgeon aims to minimise disfigurement by providing an orbital implant to compensate for lost orbital volume and customised ocular prosthesis for satisfactory cosmetic outcome.¹⁻⁴

However, socket lined with healthy mucosa with deep fornices is a prerequisite for well-fitting prosthesis. Unfortunately socket contracture causing shrinkage of orbital tissues may result from fibrosis occurring due to the initial trauma, poor surgical technique with excessive dissection, multiple socket procedures, cicatrizing diseases or irradiation.⁵⁻⁷ Severe socket contracture leads to inability to retain prosthesis and is one of the most difficult problems to address in anophthalmic patients.

Many techniques have been developed to reconstruct the fornices in an attempt to maintain prosthesis in place.⁵⁻⁷

Mucous Membrane Grafting (MMG) by harvesting oral mucosa for surface reconstruction in contracted socket is relatively easy technique employed to address early contracture.^{8,9,15} In severe cases, various materials like Dermis Fat Graft (DFG), split skin graft, cartilage, amniotic membrane have been used.¹⁰⁻¹³ Use of DFG has been extensively studied in reconstruction of severe socket contraction.¹⁰ However, harvesting of DFG requires advance surgical skills and difficult to master.

Harvesting of oral mucous membrane is a relatively easy technique. Being an autologous material it is readily available, cheap and does not undergo rejection. There is paucity of literature on use of MMG in repair of advanced stages of socket contracture.

This study aimed to find feasibility of using MMG only for repair of severely contracted socket by harvesting it multiple times from single donor site.

MATERIAL AND METHODS

Total 07 patients reporting to ophthalmology department of a tertiary

level hospital with severe contracted ocular socket were recruited in this prospective, non randomised study after obtaining informed consent. Grading of contracted socket as published by Gopal Krishna in 1980 was followed.¹⁴ According to this classification contracted socket is graded as grade 1, shallow or shelved lower fornix; grade 2, loss of both upper and lower fornices; grade 3, loss of all fornices; grade 4, loss of all fornices with reduction in palpebral aperture; grade 5, recurrence of contraction after repeated trial of reconstruction. Level grade 3 and above where shortening of all four fornices present was classified as severe in this study [Fig 1]. A comprehensive evaluation of patients was undertaken including patient's age, gender, ocular history, nature of trauma, duration from initial event, socket examination, presence of orbital implant and digital photography. Fornix depth of inferior conjunctival fornix was measured preoperatively and 8 weeks post operatively, using scale on Schirmer's strip. Use of readily available sterile Schirmer's strip was easy and comfortable for patient [Fig 2].



Fig 1: a) Contracted socket grade 3, b)c)d)Contracted socket grade 4, e) post blast injury contracted socket grade 4, f) post blast injury contracted socket grade 5

Inclusion criteria

- age above 18 years
- acquired anophthalmic contracted socket of severe grade (grade 3 and above)
- mature scar tissue or scar at least 6 months old

Exclusion criteria

- infected socket
- irradiated socket
- bone fixation implants in orbit which may prevent graft uptake



Fig 2: Measurement of fornix depth using a Schirmer's strip

Surgical technique

All patients were started on topical antibiotic eye drops Moxifloxacin 0.3% preservative free every 4 times a day 3 days prior to surgery. All patients were instructed to maintain oral hygiene and started with antiseptic mouth wash 3 times a day 3 days prior to surgery.

All surgeries were performed under general anaesthesia and surgical area prepared with 5% povidone iodine. Operative site was infiltrated with mixture of 2% lignocaine with 1:10000 adrenaline. Eye lids separated with 4-0 silk traction sutures [Fig 3a]. Incision made in central part with 15 no blade. Conjunctiva separated from underlying fibrous tissue. Haemostasis achieved by applying pressure with adrenaline soaked swabs thus avoiding use of cautery. Fibrous bands separated. Blunt dissection into the socket carried out and optimal size orbital implant placed to compensate for the volume loss if required in this first step of surgery. Central raw area measured to find out the maximal dimensions of the graft required.

MMG was harvested from inner aspect of lower lip after adding additional 25% area in the defect measured to compensate for the graft contraction. Lower lip everted by assistant and placed under traction. Area of the graft was marked with sterile marking pen taking care not to include frenulum and vermilian border of lip [Fig 3 b]. Donor site infiltrated with mixture of 2% lignocaine with 1:10000 adrenaline to separate mucous membrane from underlying

tissue and achieve haemostasis. While separating mucosa care taken not to include deeper tissue or muscle fibres. Once MMG is obtained it is cleared of any fat tissue on the under surface [Fig 3 c]. Stab incisions were made in the graft to allow for the increase in graft size as well as to allow drainage of serous fluid in graft bed. Graft then transferred to recipient site and sutured to the edges of conjunctiva with 8-0 polyglactin 910 sutures [Fig 3d]. Upper and lower fornix formation sutures passed with 4-0 silk and tied to achieve adequate depth of fornices [Fig 3e]. A snugly fitting conformer placed to maintain adequate pressure on the graft and the area of the fornices. Temporary lid closing suture with 4-0 silk in central part tied over bolster so as to keep lids slightly separated [Fig 3f]. Compression bandage applied. Donor site haemostasis achieved by pressure and with minimal use of cautery. Pressure compression by betadine gauge over vaseline mesh helped to achieve haemostasis and aid in reepithelialisation.

Post operatively, lid hygiene was carefully maintained, topical antibiotics applied and conformer was cleaned twice daily. Patients were advised a soft bland diet, apply lignocaine jelly over donor site and do betadine gargles after meals. Temporary lid closing sutures were removed after 1 week. The fornix-forming sutures were removed after 2 weeks. Patient was advised to continue the use of conformer to maintain the fornices. Repeat evaluation of socket was undertaken 6 weeks post operatively. Adequacy of fornix to hold conformer in place assessed. At this stage donor site evaluation for reepithelialisation and presence of any fibrous bands was undertaken. Repeat surgery was planned at around 8 weeks post operatively. All surgical steps were repeated as described above and MMG was harvested from same donor site. Once adequate fornix depth was achieved patient was given customised ocular prosthesis. Patients were evaluated for ability to retain prosthesis and cosmetic acceptability.



Fig 3: a) Lid traction suture, b) Harvesting of oral mucous membrane graft, c) Harvested MMG, d) MMG over recipient site, e) Fornix formation suture with retained conformer, f) Fornix formation suture with lid closing suture

Statistical analysis

Fornix depth was compared preoperatively and 8 weeks postoperatively using paired t-test. The ratio of the degree of depth increase was calculated. All statistical tests were 2-sided with an α level of 0.05 and were performed using online statistical calculators. Postoperative outcome was evaluated in respect of fornix depth and cosmetic outcome for ability to retain ocular prosthesis

RESULTS

Patients presented to our centre for cosmetic deformity with inability to retain

ocular prosthesis. A total of 07 patients, 04 females and 03 males were included in this study. The mean patient age was 43.5 years (with age range from 24 -58 yrs). The interval between patient's inability to retain artificial prosthesis and presentation to our centre varied from 1 year to 6 years (mean 3.2 years).

Two patients had sustained blast injury. Two patients had previous enucleation with implant done. Three patients had phthisis bulbi following history of post surgical panophthalmitis [Table 1].

Table 1: Demographics, clinical characteristics, surgical outcome of patients

Pt no	Sex/ Age (years)	Eye	Cause of eye loss	History of previous surgery- Enucleation /Evisceration	Duration in years	Grade of socket contraction	No of MMG stages required	Cosmetic outcome
1	M/24	Right	Blast injury	Enucleation	1	4	3	Customised prosthesis
2	F/58	Right	Post endophthalmitis	Evisceration	6	4	2	Customised prosthesis
3	F/47	left	Post traumatic	Enucleation with implant	4	4	2	Customised prosthesis
4	F/51	left	Post traumatic	Enucleation implant	2	4	2	Customised prosthesis
5	M/32	left	Blast injury	Enucleation	5	5	3	Spectacle mounted prosthesis
6	M/41	Right	Post traumatic Phthisis bulbi	-	3	3	2	Customised prosthesis
7	F/52	Left	Post endophthalmitis Phthisis bulbi	-	2	4	2	Customised prosthesis

Contraction of socket was graded as per Gopal Krishna classification. Contracted socket grade 4 was commonest presentation seen in 05 patients. Grade 3 and grade 5 contracted socket was present in 01 patient

each. Patient with grade 5 contracted socket was a post blast injury patient who had underwent previous surgical interventions for socket reconstruction. Orbital volume replacement was required in one patient

only which was done in first stage of surgery. Rest all patients were subjected to socket reconstruction with MMG. History of previous surgical intervention for shelving of inferior fornix was present in 3 patients. All patients had previous intervention done more than 6 months prior.

MMG harvested in multiple stages till adequate fornix depth achieved to hold conformer in place. MMG was harvested in

2 stages in 5 patients and 3 stages in 2 patients. Customised prosthesis was tried in all patients. 6 patients were able to achieve satisfactory cosmesis and retention of prosthesis. One patient with grade 5 socket contracture was not able to achieve adequate fornix depth even after 3 MMG and was prescribed spectacle mounted prosthesis [Fig 4].



Fig 4: a) post blast injury contracted socket grade 4 after first stage MMG, b) Retention of conformer after 2 stages of MMG, c) Customised prosthesis in situ, d) customised prosthesis left eye, e) customised prosthesis right eye, f) Spectacle mounted prosthesis for grade 5 contracted socket left eye

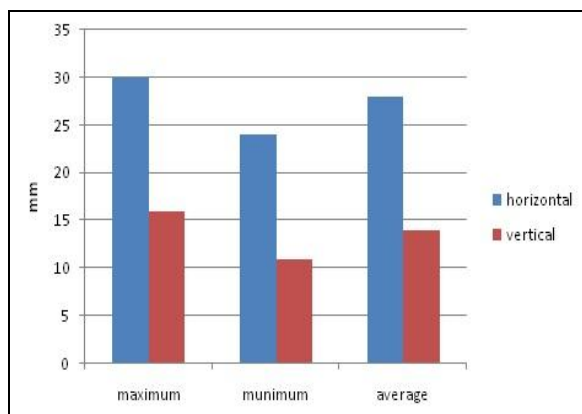


Fig 5: MMG Dimensions

Dimensions of MMG were noted. Maximum horizontal dimension of graft 30 mm and minimum horizontal dimension of graft 24 mm. Average horizontal dimension 28 mm. Maximum vertical dimension of graft 16 mm and minimum vertical dimension of graft 11 mm. Average vertical dimension 14 mm [Fig 5].

Donor site was completely reepithelised by 6 weeks post operatively. No donor site complications were noted in

this study. Repeat graft from same site after 8 weeks could be done without much difficulty. Surgeon observed more profuse bleeding from donor site but could be easily contained. Preoperatively and 8 weeks post operatively, mean fornix depth were 2.9 mm and 6.02 mm respectively. The mean increase of 3.12 mm was statistically significant ($P=0.0008$).

DISCUSSION

Many patients who are presenting for the cosmetic rehabilitation due to contracted ocular socket are young and have high expectations. They may have consulted other surgeons and may have been operated upon. Treating such patients often present a challenge for even a skilled and experienced oculoplasty surgeon.

Socket contracture is a cicatricial process which can obliterate conjunctival fornices completely. In case of mild contraction, adjusting the size of prosthesis

or correcting lower lid laxity can achieve reasonable results.¹⁶ Shelving of inferior fornix can be corrected with fornix formation sutures or lower lid repositioning.¹⁷ Such simple measures can be tried in the early stages of socket contraction.

More advanced stages of socket contraction requires reconstruction and restoration of conjunctival surface.^{1,4} Various graft materials have been tried including autologous conjunctiva, oral/buccal mucosa, hard palate grafts or cartilage grafts.^{6,7,17,18} Allograft materials like amniotic membrane or dermis have been used.^{19,20} All these techniques increases conjunctival surface and have been used with success in moderate grades of contraction.²⁰

In severe socket contraction, not only forniceal shallowing but also horizontal shortening needs to be addressed. DFG in such cases to augment orbital volume and increase surface. Uses of composite grafts with augmentation of DFG with mucosa have also been tried.²³ However use of DFG is not without complications. In a study with 468 DFGs, fitting of prosthesis after secondary DFG for variably contracted sockets had high patient satisfaction in only 57%, and complete graft necrosis was seen in 3.5-6.1% of the cases.²¹ Composite grafts with DFG have been used to achieve better surgical outcome.^{22,23} Harvesting of DFG and its implantation in contracted ocular socket requires advance surgical skills.

Various studies which used DFG or other techniques for reconstruction in advanced grades of socket contraction have tried to achieve best surgical outcome in single surgical stage.¹⁰ Comparative studies also compare different techniques to achieve satisfactory results in single stage of surgery.^{22,23} Authors feel that instead of trying to get results in first stage, multiple stage surgery with assessment for residual contracture and planning for next step will achieve better results in the management of severe contracted socket. Also simple, easy

to harvest oral mucosal grafts will achieve same results in multistage surgery. Such procedures will be more cost effective with less post operative morbidity and better patient compliance.

Mucosal grafts have shown to achieve good results in management of contracted socket.^{8,15,24} Free full thickness mucosal graft have been used for lower fornix reconstruction.²⁴ Mucosal graft from inner aspect of lower lip, buccal mucosa or hard palate used with success in moderate grades of socket contraction.^{18,24} In severe grades of contracted socket, composite graft using mucosa along with DFG have been studied with success.^{22,23} Again even in contracted socket these studies have shown results after single stage surgery.

Study by Kim et al for use of autologous buccal mucosa in anophthalmic socket reconstruction has shown that donor site morbidity was tolerable and patients recovered early without scarring or deformity.⁸ Also studies have suggested that the closure of the harvest donor site seems to worsen pain and to leave harvest sites open leads to lower pain and earlier return to a full diet.²⁶ This gives advantage of able to harvest repeat mucosal graft from donor site.

In this study, average age of patient undergoing surgical intervention was 43.5 years. Other studies have also reported study population in similar age bracket.^{8,21} The age group of patients was even younger in other studies^{19,20,22} This shows younger patients are more concerned about cosmetic rehabilitation. Proportion of females in this study (57.2%) was more than males (42.8%). However this was not significant. Trauma was the major cause for loss of an eye and subsequent development of contracted socket in 2 male patients. Average time duration between initial event and patient reporting to our centre with complaint of inability to retain prosthesis was 3 years (range 1-6 years). Most cases in this study were grade 4 contracted socket and author found no previous study which had used MMG only in reconstruction of

severe contracted socket. Multiple graft harvesting was planned and 5 cases achieved adequate expansion of socket with 2 MMG procedures. Donor site healed without complications with complete epithelisation. No case of donor site infection noticed as noticed in other studies.^{8,9,15} Surgeon encountered no problem in harvesting or implanting repeat graft. Customised ocular prosthesis could be given all but one case. Only one patient with grade 5 contracted socket could not achieve adequate socket to hold prosthesis and was given spectacle mounted prosthesis.

CONCLUSION

Relatively simple technique of oral MMG can be useful in repair of severely contracted ocular socket with multiple graftings from same donor site.

Declarations

Acknowledgement: None

Conflict of Interest: None declared

Source of Funding: None

Ethical Approval: Approved

REFERENCES

1. Schmitzer S, Simionescu C, Alexandrescu C, Burcea M. The Anophthalmic Socket-Reconstruction Options. *Journal of Medicine and Life* 2014; 7(4):23-9.
2. Collin JRO. Enucleation, evisceration and socket surgery. In: *A manual of systematic eyelid surgery*. 3rd ed. London: Elsevier-Butterworth-Heinemann; 2006. pp. 223-8.
3. Jordan, D.R., and Klapper, S.R. Evaluation and management of the anophthalmic socket and socket reconstruction. In: Black, E.H., Nesi, F.A., Gladstone, G., Levine, M.R., eds. *Smith and Nesi's Ophthalmic Plastic and Reconstructive Surgery*. New York: Springer; 2012; p. 1131-73.
4. Quaranta-Leoni FM. Treatment of the anophthalmic socket. *Curr Opin Ophthalmol* 2008; 19:422-7.
5. Tawfik H A, Raslan A O, Talib N L. Surgical management of acquired socket contracture. *Current Opinion in Ophthalmology* 2009;20:406-11.
6. Lukáts O. Contracted anophthalmic socket repair. *Orbit* 2002;21:125-30.
7. Lee YH, Kim HC, Lee JS, Park WJ. Surgical reconstruction of the contracted orbit. *Plast Reconstr Surg* 1999;103: 1129-36.
8. Kim C Y, Woo Y J, Lee S Y, Yoon J S. Postoperative Outcomes of Anophthalmic Socket Reconstruction Using an Autologous Buccal Mucosa Graft. *J Craniofac Surg* 2014;25: 1171-4.
9. Molgat YM, Hurwitz JJ, Webb MC. Buccal mucous membrane-fat graft in the management of the contracted socket. *Ophthal Plast Reconstr Surg* 1993;9:267-72.
10. Smith B, Bosniak S, Nesi F, et al. Dermis-fat orbital implantation: 118 cases. *Ophthalmic Surg*. 1983;14:941-3.
11. Betharia SM, Patil ND. Dermis fat grafting in contracted socket. *Ind J Ophthalmol* 1988; 36:110-2.
12. Hasan SA, Ferreiro AG, Bigethi C, Shaikh OA, Meneghim R, Schellini SA. Split-Skin-Graft wrapped conformer to treat severe contracted sockets. *The Journal of Craniofacial Surgery* 2018; 29:777-9.
13. Betharia SM, Kanthamani, Prakash H, Kumar S. Skin grafting in severely contracted socket with the use of "Compo". *Ind J Ophthalmol* 1990;38:88-91.
14. Krishna G. Contracted sockets -I (Aetiology and types). *Indian J Ophthalmol* 1980; 28:117-20.
15. Bowen Jones EJ, Nunes E. The outcome of oral mucosal grafts to the orbit: A three-and-a-half-year study. *Br J Plast Surg* 2002; 55:100-4.
16. Hashikawa K, Terashi H, Tahara S. Therapeutic strategy for the triad of acquired anophthalmic orbit. *Plast Reconstr Surg* 2007;119:2182-91.
17. Smith RS, Malet T. Auricular cartilage grafting to correct lower conjunctival fornix retraction and eyelid malposition in anophthalmic patients. *Ophthal Plast Reconstr Surg* 2008; 24:13-8.
18. Holck DE, Foster JA, Dutton JJ, Dillon HD. Hard palate mucosal grafts in the treatment of the contracted socket. *Ophthal Plast Reconstr Surg* 1999;15:202-9.
19. Kumar S, Sugandhi P, Arora R, Pandey PK. Amniotic membrane transplantation versus mucous membrane grafting in anophthalmic contracted socket. *Orbit* 2006; 25:195-203.

20. Bajaj MS, Pushker N, Singh KK, et al. Evaluation of amniotic membrane grafting in the reconstruction of contracted socket. *OphthalPlastReconstrSurg* 2006; 22:116-20.
21. Nentwich MM, Schebitz-Walter K, Hirneiss C, Hintschich C. Dermis fat grafts as primary and secondary orbital implants. *Orbit*. 2014;33:33-8.
22. Bhattacharjee K, Bhattacharjee H, Kuri G, Das JK, Dey D. Comparative analysis of use of porous orbital implant with mucus membrane graft and dermis fat graft as a primary procedure in reconstruction of severely contracted socket. *Indian J Ophthalmol* 2014;62:145-53.
23. Catherine J. Choi, Ann Q. Tran & David T. Tse. Hard palate-dermis fat composite graft for reconstruction of contracted anophthalmic socket. *Orbit* 2019;38:199-204.
24. M Klein, H Menneking, J Bier. Reconstruction of contracted ocular socket with free full thickness mucosa graft. *Int J OralMaxillofacSurg* 2000;29:96-8.
25. Neuhaus R W, Baylis H I, Shorr N. Complications at mucous membrane donor sites. *Am J Ophthalmol* 1982;93:643-6.
26. Rourke K, McKinny S, St Martin B. Effect of wound closure on buccal mucosal graft harvest site morbidity: results of a randomized prospective trial. *Urology* 2012; 79:443-8.

How to cite this article: Vichare NV, Maggon R. Evaluation of multistage oral mucosal grafting from single donor site in reconstruction of severely contracted ocular socket. *International Journal of Research and Review*. 2021; 8(7): 1-8. DOI: <https://doi.org/10.52403/ijrr.20210701>
