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The Effect of The Mitomycin C on Anophthalmic Contracted Socket (Literature Review)

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ABSTRACT

This study aims to provide information about the effect of the Mitomycin C on contracted sockets surgery so that Mitomycin C can inhibit migration of fibroblast and synthesis of collagen thus causing reduce fibrosis in vitro and in vivo and a significant reduction of scarring. The literature study used is the literature of the last 10 years in 2021. Literature searches were used from the Science Direct, PubMed, and Google Scholar electronic databases. The initial stage obtained 43 national and international articles that are considered relevant. The search for articles using the keywords "anophthalmic socket and mitomycin c", and "contracted socket and mitomycin c" then continued at the screening stage, which in the end obtained 5 articles that matched the object to be discussed.. The results of this study explain that the Mitomycin C has an effect in a decrease fibroblast in contracted socket surgery and has been successful in reducing recurrence by inhibiting fibrosis.

Keywords: mitomycin C; contracted socket; anophthalmic

INTRODUCTION

Contracted socket is the shrinkage of all or part of orbital tissue causing shallowing of the fornices and decrease in the orbital volume and thus causing the inability to retain prosthesis8. Socket contracture is caused by fibrosis leading to shortening of the orbital tissue4. Based on the research of Chawalla et al., out of 10 socket surgeries performed there was 1 complication of socket contracture [1,3]. The occurrence of this socket contracture will harm the patient both in terms of cost, time and psychologically because of an eye prosthesis that cannot be installed, eyelid abnormalities and repeated surgeries [2].

Mitomycin C (MMC) and 5-Fluorouracil (5-FU) are most commonly used antifibrotic agents in ophthalmic surgeries [4,7]. Mitomycin-C (MMC)) is an anti-neoplastic/ antibiotic agent isolated from soil bacterium Streptomyces caespitosus. that can inhibit DNA synthesis. Mitomycin C is a chemotherapeutic agent used for the treatment of bladder cancer, but disease progression after mitomycin C treatment is common [5]. Mitomycin-C has been widely used as an antifibrosis in the operation of glaucoma, pterygium, ocular surface neoplasia and nasolacrimal duct obstruction [5]. Its application in ophthalmology surgery has been increasing because effects on wound healing by inhibits migration of fibroblast and synthesis of collagen thus causing reduce fibrosis in vitro and in vivo and a significant reduction of scarring [9,13].

In a previous study, mitomycin C was used as an adjunct therapy in addition to reconstructive surgery for socket contractures.

Fibrosis of the conjunctiva is the main thing that must be prevented in reconstructive surgery of the socket and its antifibrotic properties are utilized in the use of Mitomycin C. Mitomycin C can be used in ophthalmic preparations or in subconjunctival injection during surgery and postoperatively [8].

The study is conducted to assess the effect of Mitomycin C on Anophthalmic contracted socket.

METHODOLOGY

This research design uses a literature review study method. The literature study used is the literature of the last 10 years in 2021. Literature searches were used from the Science Direct, PubMed and Google Scholar electronic databases. Literature screening was carried out by assessing the inclusion and exclusion criteria. The initial stage obtained 43 national and international articles that are considered relevant. The search for articles using the keywords "anophthalmic socket and mitomycin c", "contracted socket and mitomycin c" then continued at the screening stage, which in the end obtained 5 articles that matched the object to be discussed.

The inclusion criteria set include: research articles on the effect of Mitomycin C in Anophthalmic contracted socket, full text, open access, publications from 2011 to 2021, articles using Indonesian and English. Likewise, the exclusion criteria include: articles in the literature review, systematic reviews.

The following table briefs few researches that were taken into consideration.

TABLE 1: Review of Research Results

No	Title	Journal	Results and Conclusion
1	Use of Antimetabolites in the Reconstruction of Severe Anophthalmic Socket Contraction [9]	Ophthalmic Plastic & Reconstructive Surgery. 2012	5 patients with severe socket contraction were reviewed 5Fluorouracin or Mitomycin C was used during surgery. After surgery, all 5 were able to retain an ocular prosthesis. The use of adjunct antimetabolite in severe anophthalmic socket reconstruction is an effective option that is well tolerated with minimal side effects.
2	Mucous membrane grafting augmented with topical mitomycin C application in contracted socket repair surgeries [10]	Journal of Ocular Pharmacology and Therapeutics. 2016	40 patients contracted sockets were randomly enrolled into 2 groups, postoperative inferior fornix (IF) depth was significantly deeper in group B (with MMC) than in group A (without MMC). Intraoperative MMC (0.2 mg/mL) in contracted socket reconstruction plays a significant role in maintaining prosthetic eye.
3	Revisiting the role of the myofibroblast in socket surgery: an immunohistochemical study [11]	Ophthalmic Plastic and Reconstructive surgery. 2016	The mean count of rabbit myofibroblasts was highest for the control group, mitomycin-C achieved the lowest mean value, followed by triamcinolone, 5-FU, and bevacizumab achieved the least reduction in myofibroblast count. A single injection of mitomycin-C or triamcinolone during surgery achieves the highest mean reduction of myofibroblast count.
4	Effect of Mitomycin C on human tenon fibroblast proliferation in contracted socket tissue [12]	EurAsian Journal of BioSciences. 2019	Human tenon fibroblasts from a patient who underwent socket reconstruction surgery were cultured in vitro. A 5 min exposure to mitomycin C at 0.2, 0.4, and 1 mg/ml caused inhibition of fibroblast proliferation ($p < 0.05$). Mitomycin C can inhibit tenon fibroblast proliferation of contracted socket tissue. Dose escalation of mitomycin C is not related to the rate of fibroblast proliferation inhibition.
5	Evaluation of Topical Mitomycin-C Eye Drops After Reconstructive Surgery for Anophthalmic Contracted Socket [13]	Clinical Ophthalmology (Auckland, NZ). 2021	The main postoperative outcome measures were superior fornix depth (SFD), inferior fornix depth (IFD) and SV at the end of 6th postoperative month. These differences in the postoperative SFD, IFD and SV between both groups were statistically significant. Postoperative use of topical MMC is associated with higher forniceal depth and greater SV when compared to the conventional treatment in socket reconstructive surgeries with amniotic membrane graft (AMG).

DISCUSSION

Contracted socket is one of the complications after socket surgery, where there is shrinkage of the orbital tissue accompanied by a decrease in orbital volume and also a decrease in fornix depth, causing the inability of the socket to maintain the prosthesis. This is aesthetically displeasing to the patient, and significant functional and psychosocial disability [1,6]. Contracted socket caused by various factors, one of which is fibrosis of the conjunctival tissue. Management of socket contractures with repeated surgical procedures will exacerbate the appearance of scar tissue and make some cases inoperable [13].

Each surgical procedure inevitably causes trauma to the socket tissue, which will result in further socket contractures. Until now there is no ideal surgical technique or therapy for the management of socket contracture cases. Prevention of postoperative conjunctival fibrosis is the main key to the success of socket reconstruction surgery [7].

Studies have been conducted to determine the prevention of fibrosis. The use of steroids and antimetabolites used to prevent fibrosis formation after socket surgery Mitomycin C (MMC) is one of the antimetabolite agents used to inhibit fibroblasts.

MMC is used in glaucoma and pterygium surgery and has been successful in reducing recurrence by inhibiting fibrosis. The use of MMC can also be applied in the management of socket contractures [5,13]. Major complications are rare include scleral ulceration, necrotizing scleritis and perforation [5].

In this literature, studies the effect of Mitomycin C on contracted sockets was carried out on human subjects and animal models, in vitro and in vivo. Studies use human subjects conducted by Priel et al., reported that that the use of antimetabolites is effective as adjuvant therapy in severe socket contracture surgery. All 5 patients were able to retain an ocular prosthesis [9]. In addition, in a study conducted by Mandour et al., reported that postoperative inferior fornix depth was significantly deeper in group with intraoperative MMC (0.2 mg/mL) in contracted socket reconstruction plays a significant role in maintaining prosthetic eye [10]. A similar case was also reported in a study by Mattout et al., explaining that Postoperative use of MMC eye drops is associated with higher forniceal depth and greater socket volume when compared to the conventional treatment in socket reconstructive surgeries [13]. In vitro studies with human subjects also conducted by Metita et al., with culture Human tenon fibroblasts from a patient who underwent socket reconstruction surgery. Mitomycin C can inhibit tenon fibroblast proliferation of contracted socket tissue [12]. Meanwhile, there is 1 in vivo study on animal models conducted by Tawfik et al., compare a single subconjunctiva injection of mitomycin-C, triamcinolone, 5-Fluouracil, and bevacizumab. Mitomycin-C or triamcinolone during surgery achieves the highest mean reduction of myofibroblast count [11].

Thus, it can be seen that the Mitomycin C has resulted in a decrease in fibrosis with inhibit fibroblasts. Mitomycin C is used in contracted socket surgery and has been successful in reducing recurrence by inhibiting fibrosis.

CONCLUSION

The Mitomycin C has effect in a decrease fibroblast in contracted socket surgery and has been successful in reducing recurrence by inhibiting fibrosis.

REFERENCES

[1] Johnson TE. Management of the Contracted Socket. In Anophthalmia 2020 (pp. 193-208). Springer, Cham.

[2] Quaranta-Leoni FM, Fiorino MG, Quaranta-Leoni F, Di Marino M. Anophthalmic Socket Syndrome: Prevalence, Impact and Management Strategies. Clinical Ophthalmology (Auckland, NZ). 2021; 15:3267. doi: 10.2147/OPTH.S325652

[3] Chawla U, Anand N, Gupta R, Chadha G, Khurana AK. Epidemiology of Oculoplastic Surgeries Performed at Tertiary Eye Care Hospital in Northern India. Epidemiology. 2021 Apr;9(4).

[4] Shrirao N. Management Options for Acquired Contracted Socket. MEDICAL & VISION RESEARCH FOUNDATIONS. 2014 Oct;32(3).

[5] Singh P, Singh A. Mitomycin-C use in ophthalmology. IOSR Journal of Pharmacy. 2013;3(1):12-4.

[6] Peseyie R, Raut AA. Contracted Socket. InStatPearls [Internet] 2022 Jan 1. StatPearls Publishing.

[7] Kamal S, Kumar S, Goel R, Bodh SA. Serial sub-conjunctival 5- Fluorouracil for early recurrent anophthalmic contracted socket. *Graefes Arch Clin Exp Ophthalmol*. 2013; 251:2797–2802. doi:10.1007/s00417-013-2478-1

[8] Borrelli M, Geerling G, Spaniol K, Witt J. Eye Socket Regeneration and Reconstruction. Current eye research. 2020 Mar 3;45(3):253-64. doi.10.1080/02713683.2020.1712423

[9] Priel A, Oh SR, Whipple KM, Korn BS, Kikkawa DO. Use of antimetabolites in the reconstruction of severe anophthalmic socket contraction. Ophthalmic Plastic & Reconstructive Surgery. 2012 Nov 1;28(6):409-12. doi: 10.1097/IOP.0b013e3182627e86

[10] Mandour SS, Elmazar HM, Marey HM, Rahman AK, Sakr RA. Mucous membrane grafting augmented with topical mitomycin C application in contracted socket repair surgeries. Journal of Ocular Pharmacology and Therapeutics. 2016 Dec 1;32(10):691-4. doi: 10.1089/jop.2016.0041

[11] Tawfik HA, Abdulhafez MH, Fouad YA, Rashed HO, Osman WM. Revisiting the role of the myofibroblast in socket surgery: an immunohistochemical study. Ophthalmic Plastic and Reconstructive surgery. 2016 Jul;32(4):292. doi: 10.1097/IOP.0000000000000510

[12] Metita M, Dewi DS, Sujuti H. Effect of Mitomycin C on human tenon fibroblast proliferation in contracted socket tissue. EurAsian Journal of BioSciences. 2019 Aug 1;13(2).

[13] Mattout HK, Fouda SM, Al-Nashar HY. Evaluation of Topical Mitomycin-C Eye Drops After Reconstructive Surgery for Anophthalmic Contracted Socket. Clinical Ophthalmology (Auckland, NZ). 2021; 15:4621. doi: 10.2147/OPTH.S343550