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Clinical Evaluation of 188 Patients with Contracted Socket

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Abstract

Purpose: To evaluate our results in the management of socket contraction.

Design: Case series

Method: One hundred and eighty eight patients with contracted sockets were retrospectively analyzed. Reasons for eye removal, type of initial surgery, presence of an implant, time of onset of contraction, degree of contraction, additional pathologies accompanying contraction, type of surgery for the contracted socket, additional interventions, number of surgeries, and final status were recorded and evaluated.

Results: There were 101 (53.72%) male and 87 (46.28%) female patients, with an age range between 1 and 78 years (mean 35.46 years). Mean follow-up was 45.6 ± 22.34 months (range 5-120 months). Trauma was the reason for eye removal in 80(42.55%) patients. Enucleation performed in 146(77.66%) patients was the most common initial surgery. An implant was absent in 143(76.06 %) patients. Time of onset of contraction was longer than 5 years in 56 (29.79%) patients. Moderate or severe contraction was recorded in 134(71.28%) patients. Totally 229 procedures were performed for socket surface expansion and 30.32% of patients required more than one surgery. 151(80.32%) patients had additional pathologies. At the final visit, 138 (73.4%) patients had a good or acceptable result.

Conclusion: Contracted socket remains to be a challenging entity of oculoplastic surgery. It may develop at any time following removal of the eye. Additional pathologies frequently accompany the contracted socket. Even though wearing an artificial eye eventually becomes possible in the majority of cases, it is still hard for some patients even after a series of reconstructive interventions.

Keywords: Contracted socket, Socket surgery, Anophthalmia

Introduction

Anopthalmia leads to cosmetic deformity and may affect patients' psychology [1]. Fitting an ocular prosthesis is mandotary in the management of anophthalmia. Socket contraction is the main problem in the anopthalmic patients and characterized by scarring, granulation tissue formation and loss of fornices [2]. Histopathological changes are infiltration of inflammatory cells, metaplasia of conjunctival epithelial cells, keratinization and goblet cell count reduction [3]. The aim of socket surgery is to form a socket which is able to carry an ocular prosthesis which simulates normal fellow eye [4,5]. In an anophthalmic socket, to fit prosthesis, presence of adequate fornices and lining is mandatory. Socket contraction leads to fornix and lining deficiency (Figure 1). Many factors, including fibrosis due to initial trauma, poor surgical technique, multiple socket procedures, irradiation, alkali burns, cicatrizing disease of conjunctiva may be the reason of socket contraction [6]. In moderate or severe forms of socket contraction, it may be impossible to fit prosthesis (Figures 2-4) [7].

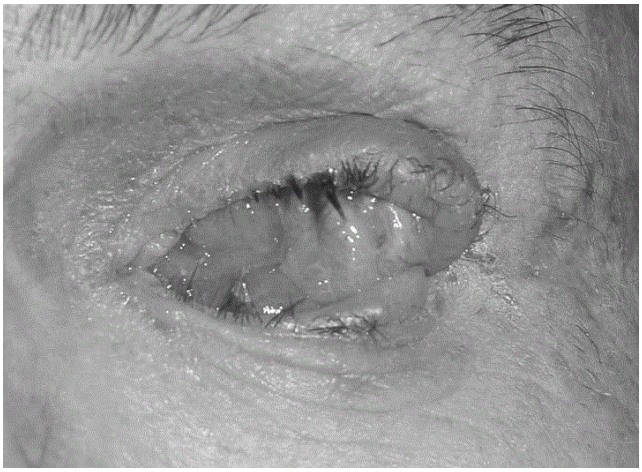

Figure 1: Contracted socket

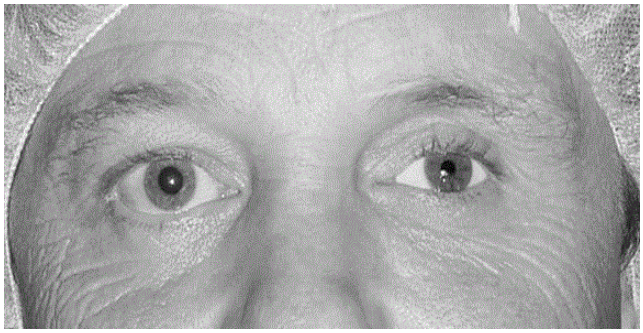

Figure 2: Mild socket contraction

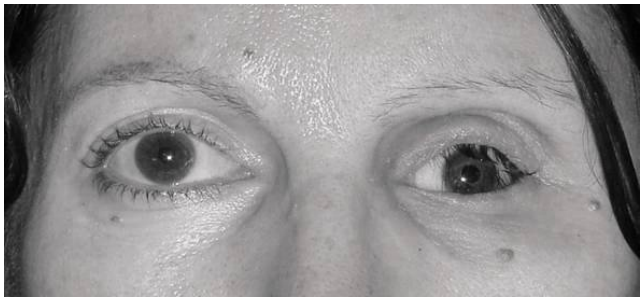

Figure 3: Moderete socket contraction

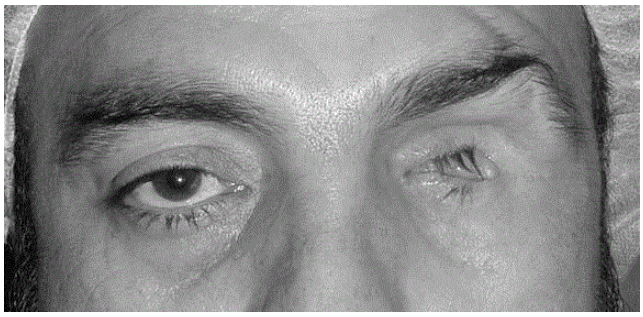

Figure 4: Severe socket contraction

In this study we aim to present our 17-year experience with patients having contracted sockets. Our series of 188 cases is one of the largest in the literature to evaluate demographic features of patients with contracted socket, additional pathologies accompanying contraction, management, and cosmetic results.

Methods

One hundred and eighty eight eyes of 188 patients with contracted sockets referred to our oculoplastic department between October 1993 and October 2010 were retrospectively analyzed. 4 surgeons performed the surgeries (DS,SK,MA,IBB). Degree of contraction was classified as mild, moderate, and severe (Table 1). Reasons for eye removal, type of initial surgery, presence of an implant, time of onset of contraction were recorded. Time of onset of contraction was considered as the time interval between the pimary surgery and the time that the patient was not able to fit the ocular prosthesis. All eyes underwent detailed oculoplastic examination. Additional pathologies accompanying contraction were detected. Surgeries performed for the contracted socket and for additional pathologies were recorded. Final status was classified as good, acceptable and poor (Table 2). Tenets of Helsinki were followed in the study and all patients gave informed consent.

The categorized data were analyzed with the chi-square test. A probability level of <0.05 was considered statistically significant.

Mild	Scarring or shortening of usually one fornix, mild contraction of the conjunctival surface, patient can still wear an artificial eye
Moderate	Shortening of both fornices Some contraction in the central socket Patient can wear an artificial eye with difficulty or not at all
Severe	Total or near total contraction of the socket. Fornices usually indiscernible. Patient can not wear an artificial eye

Table 1: Grading of socket contraction

Good	Adequate fornices, mild or no conjunctival surface contraction, patient can easily wear the prosthesis.
Acceptable	Some residual shortening of fornices and contraction of the conjunctival surface that allows the patient to wear the prosthesis, usually with some difficulty.
Poor	Shortening of fornices and contraction of the conjunctival surface. Patient cannot wear the prosthesis.

Table 2: Grading of final status

Results

There were 101 (53.72%) male and 87 (46.28%) female patients, with an age range between 1 and 78 years (mean 35.46 years). Mean follow-up was 45.6 ± 22.34 months (range 5-120 months). Trauma was the reason for eye removal in 80 (42.55%) patients (Table 3). Enucleation performed in 146 (77.66%) patients was the most common initial surgery (Table 4). An implant was absent or extruded in 143 (76.06%) patients (Table 5). Time of onset of contraction was longer than 5 years in 56 (29.79%) patients (range 6 months-53 years) (Table 6). Moderate or severe contraction was recorded in 134 (71.28%) patients (Table 7). One hundred and fifty one (80.32%) patients had additional pathologies and required additional interventions. Most common additional pathology was cosmetically significant volume deficit (Figure 5 and Table 8). Totally 159 interventions for additional pathologies were performed. 92 (57.86%) were for volume deficit which was overcome by secondary implantation, implant replacement or implant revision. Totally 229 procedures were performed for socket surface expansion (Table 9) and 30.32% of patients required more than one surgery (Table 10). At the final visit, 138 (73.4%) patients had good or acceptable results (Table 11).

In statistical analysis, severe contraction (p=0.02) and onset of contraction during the first year after primary surgery (p=0.03) were found to be significantly correlated with poor outcome.

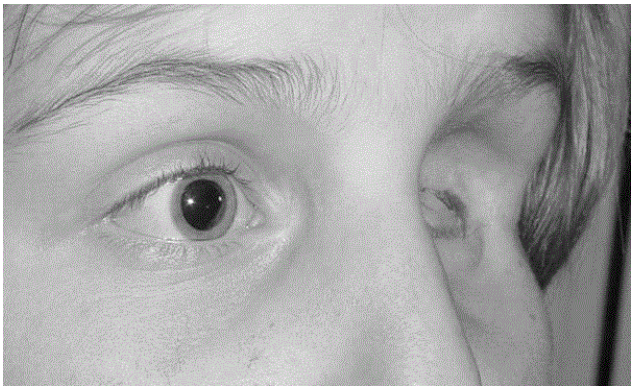

Figure 5: A patient with volume Deficit

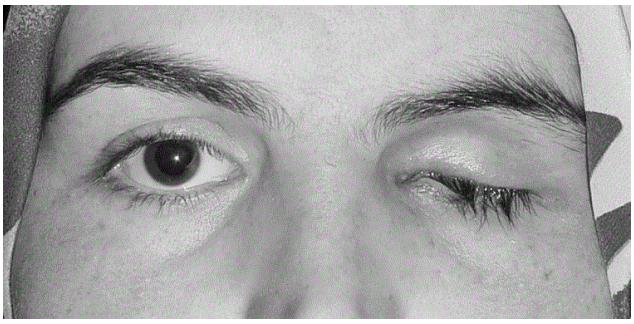

Figure 6: A patient with good outcome (Preoperative)

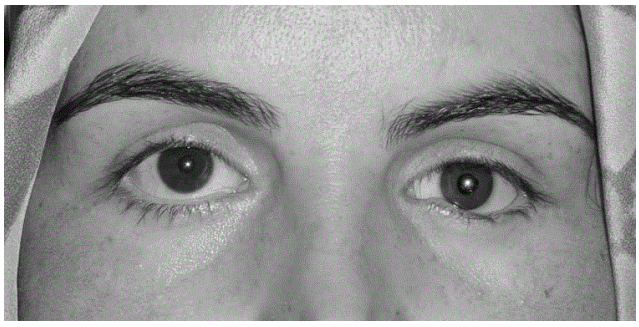

Figure 7: A patient with good outcome (Postopertive)

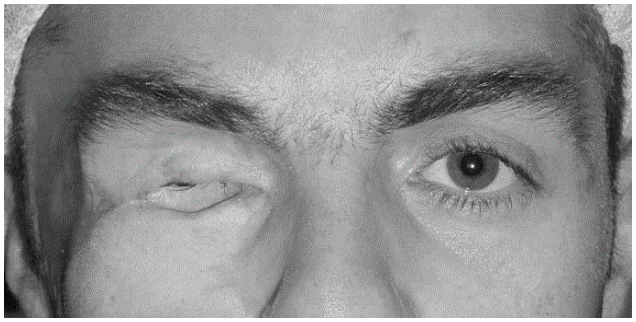

Figure 8: Even though wearing an artificial eye eventually becomes possible in the majority of cases, it is still hard for some patients even after a series of reconstructive interventions (preoperative, left)

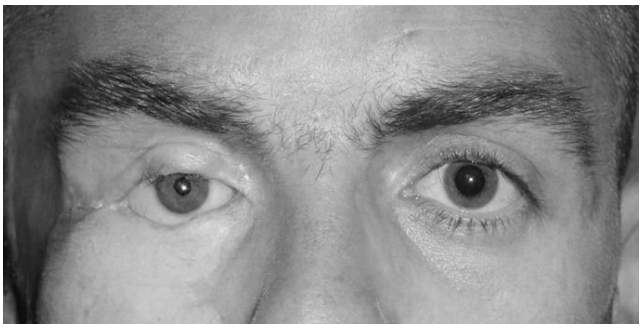

Figure 9: Even though wearing an artificial eye eventually becomes possible in the majority of cases, it is still hard for some patients even after a series of reconstructive interventions (postoperive, right)

Etiology	Number of patients	%
Trauma	80	42.55
Tumor	31	16.49
Infection	19	10.11
Ocular	12	6.38
Unknown	46	24.47
Total	188	100

Table 3: Reasons for eye removal

Initial surgery	Number of patients	%
Enucleation	146	77.66
Evisceration	14	7.45
No surgery (Phtisis)	16	8.51

Unknown	12	6.38

Table 4: Type of initial surgery

Implant	Number of patients	%
Absent	143	76.06
Present	35	18.62
Extruded	10	5.32
Total	188	100

Table 5: Presence of an implant

Time of onset	Number of patients	%
<1 year	48	25.53
1-5 years	24	12.77
5-10 year	28	14.89
>10 years	28	14.89
Unknown	60	31.92
Total	188	100

Table 6: Time of onset of contraction

Degree of contraction	Number of patients	%
Mild	54	28.72
Moderate	115	61.37
Severe	19	10.11
Total	188	100

Table 7: Degree of contraction

Additional pathologies	Number of patients	%
Volume deficit (cosmetically significant)	122	64.89
Entropion	16	8.51
Contour deformity	16	8.51
Ptosis	14	7.45
Lower lid laxity	13	6.91
Symblepharon	9	4.79
Ectropion	9	4.79
Lid defect	5	2.66
Orbital flor fracture	5	2.66
Upper lid retraction	5	2.66
Conjunctival granuloma	2	1.06
Traumatic telecanthus	2	1.06
Orbital deformity	2	1.06
Lower lid retraction	2	1.06

Table 8: Additional pathologies accompanying contraction

Procedure	Number of patients	%
Mucous membrane graft	114	49.78
Dermis-fat graft	19	8.30
Skin graft	8	3.49
Hard palata graft	11	4.81
Fornix sutures	24	10.48
Other	53	23.14
Total	229	100

Table 9: Procedures for socket surface expansion (primary interventions)

Number of interventions	Number of patients	%
1	85	45.21
2	37	19.68
3	12	6.38
4	6	3.19
5	2	1.06
None	46	24.47
Total	188	100

Table 10: Number of interventions for socket contraction

Final status	Number of patients	%
Good	41	21.81
Acceptable	97	51.59
Poor	14	7.45
Refused treatment	36	19.15
Total	188	100

Table 11: Final Status of the patients

Discussion

Socket contraction is one of the main problems following eye removal [1,8] . Contraction is a progressive process that reduces socket volume [9,10]. It makes the patient unable to keep the ocular prosthesis in the socket. Adequate conjunctival surface and deep fornices are crucial in supporting the prosthesis. Management of contracted socket is challenging. As oculoplastic surgeons, our aim is to achieve good cosmetic results by forming a socket with adequate fornices and conjunctival surface and correction of volume deficit and

additional lid pathologies such as eyelid laxity, ptosis, entropion, and ectropion. In this study, we present our 17-year experience with patients having contracted sockets.

In our series, there were many etiologies for eye loss and trauma was the most common factor (42.55%). Etiology of eye removal is differing from area to area and from country to country. In Hirako's study [11], traumatic cause of eye removal was noted in 40% of the patients. Trauma may play a role in contracture by causing tissue loss, promoting inflammation, or disturbing the vascular supply of the socket. And also financial and education level factors affect largely on the degree of contraction, as poor uneducated countries have more contraction of the sockets than others

Contraction may occur after enucleation, evisceration or phtisis. Enucleation was the primary surgery in 77.66% of our patients with contracted sockets. Enucleation itself is reported to be a possible cause for contraction [1]. Intraorbital structures are disrupted more in enucleation surgery than in evisceration; and this may play a role in contraction. Two problems have to be addressed after enucleation. First problem is volume loss and the second problem is shortening of the conjunctiva. Cosmetically significant volume loss was the most common additional pathology in our study group. In 76.06% of our patients, an implant was not present and in anophthalmic sockets, especially in those without implants, it is reported that myofibroblasts may lead to progressive contraction and the degree of contraction of the socket affected largely by the timing for eye ball implantation [9]. 92 (57.86%) of additional interventions in our series were performed for volume deficit. We overcame volume deficit by secondary implantation, implant replacement, or implant revision. Reconstruction must begin at the time of eye removal. Except for some malignancy cases, primary implant placement after enucleation and evisceration must be considered in all cases, even in patients with endophthalmitis to reduce the need for delayed secondary implantations [12,13]. Implanting a sizeable orbital implant, inserting a conformer into the socket during surgery, and fitting the patient with an adequate prosthesis subsequently are essential in the rehabilitation of the anophthalmic patient.

Moderate or severe contraction was recorded in 134 (71.28%) patients. 30.32% of patients required more than one surgery for socket surface expansion. Mucous membrane grafting is well-known technique and also was the most commonly performed procedure for socket surface expansion in our series [14]. We preferred lip and buccal mucosa. If volume deficit with contraction persisted after implantation, we performed dermis-fat grafting. Dermis-fat grafts were taken from abdominal or gluteal region. In only dry sockets, we prefered dry skin grafts. Dry skin grafts may cause some complications in wet sockets [6]. Hard-palate grafts were used for reconstruction of posterior lamella and lids. Fornix sutures were used for reconstruction of fornices in mild cases. Temporal muscle transpositions flaps were used in irradiated, avascular sockets for increasing the vascular supply. We achieved acceptable results with these procedures. Some recent studies report that amniotic membrane grafting gave cosmetically and functionally acceptable results, comparable to those of mucous membrane grafting, with a low rate of complications, and without discomfort of donor sites in cases of mild to moderate grades of contracted sockets [15,16]. Amniotic membrane is known to promote conjunctival epithelial cell migration over the graft, and to inhibit inflammation and fibrosis [17,18]. Presence of some healthy conjunctival epithelial cells in the socket is essential for amniotic membrane grafting [15]. We used amniotic membrane grafts only if the patients did not let us take an oral mucosal graft and in only mild to moderate cases. Further studies that compare the outcomes of all these procedures used for socket surface expansion with larger numbers of patients are required to comment on the superiority, if any, of these alternative methods over each other.

Additional pathologies may also accompany contraction in anophthalmia and these pathologies must also be managed in order to be able to keep a prosthesis in the socket and hence to increase cosmetic satisfaction. Eyelid pathologies were the second most encountered problem following volume deficit in this group of patients. Totally, 159 interventions for additional pathologies were performed. Volume deficit should be corrected before any lid surgery [1]. After management of volume deficit, we performed surgeries for socket surface expansion, then we performed surgeries for lid pathalogies which prevented fitting of the prosthesis. After fitting the ocular prosthesis, we performed lid surgeries to achieve better cosmetic results.

Good or acceptable outcome with conjunctival surface and fornices that allowed the artificial eye to be worn was achieved in 73.40% of the patients (Figures 6 and 7). Thirty six patients (%19.15) with contracted sockets refused treatment. In only 7.45% of the operated eyes, the socket remained insufficient. Severe contraction ($p=0.02$) and onset of contraction during the first year after primary surgery ($p=0.03$) were significantly correlated with poor outcome. Rapid onset suggests a highly active progressive process which is expected to poorly respond to treatment. Similarly, it is reasonable to find that the outcomes are poor in severely contracted sockets because the conjunctival surface is insufficient, there are usually more than one accompanying additional pathologies and therefore more aggressive surgery is performed to rehabilitate these sockets and the results are more unpredictable.

In conclusion, contracted socket remains to be a challenging entity of oculoplastic surgery. It may develop at any time following removal of the eye. Additional pathologies frequently accompany the contracted socket. Even though wearing an artificial eye eventually becomes possible in the majority of cases, it is still hard for some patients even after a series of reconstructive interventions [Figure 8 and 9].

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