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

Anophthalmia leads to cosmetic deformity and may affect patients’ psychology [1]. Fitting an ocular prosthesis is mandatory in the management of anophthalmia. Socket contraction is the main problem in the anophthalmic 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 anophthalamic 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].
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 primary 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.

### Table 1: Grading of socket contraction

| Category | Description |
|----------|-------------|
| 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 2: Grading of final status

| Category | Description |
|----------|-------------|
| 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. |

**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 (Postoperative)

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 (postoperative, 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 |
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 |
| Dennis-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 ptosis. 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].

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 pathologies which prevented fitting of the prosthesis. After fitting the ocular prosthesis, we performed lid surgeries to achieve better cosmetic results.

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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