COURSE # 713 **SUNDAY OCTOBER 20, 2002**

FITTING THE CONTRACTED SOCKET

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INTRODUCTION:

Contracted sockets present some of the most challenging sockets, and not just to the Ocularist. Oculoplastic surgeons and Ocularists alike need to recognize the importance of a balanced multidisciplinary approach to the management of these cases. In reviewing the literature relating to contracted sockets in various medical journals, surgeons still do not seem to understand the level of involvement required by the Ocularists. Without this level of cooperation, many patients will have undergone numerous surgical procedures for very little, if any benefit.

The most critical aspect of contracted sockets is to identify the realistic goals in the management of these cases. The only possible way to achieve this is with the understanding of each other's capabilities. When I say this, I don't just mean the Oculoplastic surgeon and the Ocularist, I also mean the "PATIENT". It has become painfully clear to me that without the full cooperation and understanding from the patient as to what this procedure involves, success will be limited. Therefore, I cannot stress enough, that an understanding of each other's abilities and strategies are paramount to the success of these cases.

HISTORY OF CONTRACTED SOCKETS

It is my belief that the management of contracted sockets was invariably dealt with either by the surgeon or the ocularist individually up until the **Journal of the American Society of Ocularists** started publishing articles by both ophthalmologists and ocularists. There are several surgeons who recognized the need for therapeutic devices in the management of the contracted socket. There are also as many or more ocularists who had the understanding of the management techniques themselves since the advent of the plastic prosthesis. However, I believe Drs. Allen M. Putterman and Dr. James W. Forest, who published an article in **"Ophthalmic Surgery"** in March of 1988, had the most extensive review of the contracted socket. The article **"A Surgical Technique for the Successful and Stable Reconstruction of the Totally Contracted Ocular Socket"** covers ten years of work with 47 severely contracted sockets. Dr. Putterman also published an article on the **"Reconstruction of Deep Ocular Fornices in the Contracted Socket"** in the **"Today's Ocularist"** in 1978. It is this understanding of the multi-disciplinary approach that has enabled us to fully understand the perspectives of socket reconstruction from both the ocularists and ophthalmologists perspectives.

When referring to the history of contracted sockets, the term history becomes quite misleading. History of contracted sockets in this presentation relates to the use of therapeutic devices most commonly related to the use of the plastic prosthesis.

The reason I focus the presentation in this matter is quite simple. I believe, to properly manage a contracted socket, the prosthesis or conformer is constantly undergoing adjustments and/or

enlargements. This management technique is only fully utilized with the modified impression fitting process.

There are a vast number of journal articles that relate to the management of the contracted socket and the use of different grafts. For the ocularists sake I feel it most useful to deal with those cases in which the anophthalmic socket can no longer retain a prosthesis. As we all realize, this is the most crucial situation for both the patient and the ocularist.

Mustarde's external fixation device as described by Dr. A. Callahan in the Southern Medical Journal in June 1966 indicates an early approach to contracted socket management. The external device (**Fig. 1**) shows a device that tries to focus pressure on the socket with an acrylic mold from an external steel rod connected by a lock bolt. The concept is common to all ocularists who try to manage the contracting forces of the socket with any type of external pressure. The concept remains the same, however it appears the devices differ.

The use of the rigid Putterman or "C" shape conformer (**Fig. 2 J,K,L,M**) as described by Putterman in **"Todays Ocularist"** in 1978 was, in my opinion, a quantum leap in both understanding and dealing with the contracted socket. Dr. Putterman fully understood the forces of contraction under which the socket can be subjected. Dr. Putterman also understood the complications and needs of the ocularist in dealing with these cases post-operatively.
I believe this insight to be a key to his success. Dr. Paris and Walter Spohn also wrote an article in **"Ophthalmic Surgery"** in August 1983 dealing with the contracted socket. In this article the use of RTV silicone as a stint for mucosal grafting was reported. I believe the technique to have been innovative and showed an excellent success ratio of 17 successful cases out of 21 contracted sockets.

An article written by Dr. John N. Herrington in 1979 presents us with a further modification of the conformer to be used during surgery. The article was published in **"Today's Ocularist"** and describes what I refer to as a modification of the Putterman "C" shape conformer **(Fig.3 A,B,C)** I found the concept to be an excellent approach and in many ways superior to the Putterman design. I believe this concept addresses the unique situation of each case. In my experience, this is the most adaptable approach. I also believe that not all contracted socket situations require the drilling of bone to anchor the conformer. Quite often many cases are successful by taking a good bite of periosteum with good sutures. One of the concepts of this approach is the minimizing of the tensions of contracture. Dr. Harrington believes that designing the conformer to extend into the superior and inferior fornices allows for a better design of the socket "so that the tensions of contracture oppose themselves minimally and in one plane."

This design also calls for the custom making of the conformer for each specific patient. I can't stress enough the importance of this aspect. Truly it is easier for an ocularist to envision the type of shape he believes would ultimately serve this patient best. Working with the surgeon to understand each others needs and skills is imperative to success. This design also has a very unique, if not little understood advantage, that can be a godsend when reconstructing the orbit. This design forms a physical barrier between the superior and inferior lids. On several occasions using the "C" shape conformer and modified designs by myself I have experienced the fusion of the superior lid in part and in whole to the inferior lid. This situation necessitates the need for further surgery just to remove the device. Using the Harrington conformer I have not experienced this complication. Some of the modifications I have made with this design are the need for more holes to anchor the mucosal graft, as well as in some cases the need to extend

deeper into the socket like a Putterman, however not going to a "C" shape design. Again, in the hands of a good team this style of device serves our patients best.

In the past, one of the common repair techniques for contracted sockets utilized full thickness or split thickness skin grafts. Ocularists who have had dealings with these sockets quickly understand their limitations and drawbacks. One of the most common limitation's is an odour that permeates from the orbit graft. It can become quite offensive and needless to say quite embarrassing to the patient. Often these patients need to have their prosthesis replaced more frequently due to this permeating odour. An article published by Dr. Haggai Tsur, et al in the **"Ophthalmic Surgery Journal"** in May of 1991 reported repair of the contracted socket with meshed skin graft and semi-rigid conformers. It was their opinion that this was a viable option where mucosal grafting was tried and failed, or when there was no possibility for mucosa for some reason. Dr. Tsur felt that this was a superior procedure to the use of non-meshed split thickness skin grafts. The use of the palatal mucosal graft for reconstruction of the eyelid was reported by Siegal (1985). Drs. Yoshimura, Nakajima and Yoneda report the use of the palatal mucosal graft in the reconstruction of the contracted socket in the journal of **"Cranio Maxillo-Facial Surgery"**. Drs. Yoshimura, et al comment on the tarsus-like rigidity in relation to its ability to give form to the socket as well as being "moist". Unfortunately, they do not use any type of conformer to stabilize or support the graft. Instead sutures to deepen the fornix are used. Having worked with palatal mucosal grafts several times I believe this study to be a classic example of not utilizing the multidisciplinary approach that is the key to the overall success. Dr. Yoshimura accepts contraction as a common denominator to this procedure. I believe this can be minimized with a proper management technique of a conformer stabilizing the socket as well as proper post-operative management with conformers.

In an article written by Dr. J.R. Collin and Dr. P.A.J. Moriarty they comment on the use of fornix deepening sutures used in conjunction with a graft. Sutures are passed through a silicone rod or gutter in the fornix and brought through the skin and tied over a bolster. A conformer is then put in to help maintain shape. This method is, in my opinion, possible for mildly contracted sockets. I've seen it work on several occasions with good results, however there is always a temptation to use tarsorrhaphy sutures to enhance the situation for retention of the conformer. I believe this to be a mistake as quite often the sutures pull or rip through the lids causing a difficult notch in the lids to repair. If a conformer is to be sewn in the socket, a Harrington type design is much better suited anchored either to periosteum or bone

The use of Polytef (Polytetrafluoroethylene) Alloplastic Grafting as a substitute for mucous membrane grafts as reported by Drs. P. Levin and Dr. J.J. Dutton touches on an interesting concept of using polytef to form a physical break between the raw surfaces of the reconstructed socket. Their study of nine patients showed excellent promise.

As you can see there have been a lot of innovative materials and techniques used in the management of the contracted socket. The goal of all ocularists should be to further enhance this wealth
of information and learn from it.

CLASSIFICATION

Classification of any type always leads to some degree of controversy. However, an article written by Dr. Gopal Krishna **"Contracted Sockets I"** clearly defines a series of categories and classifications for the contracted socket. Listed below are the classifications as outlined by Dr. Gopal Krishna:

Grade 0: Socket is lined with the healthy conjunctiva and has deep and well formed fornices.

Grade I: Socket is characterized by the shallow lower fornix or shelving of the lower fornix. Here the lower fornix is converted into a downwards sloping shelf which pushes the lower lid down and out preventing retention of an artificial eye.

Grade II: Socket is characterized by the loss of the upper and lower fornices.

Grade III:Socket is characterized by the loss of the upper, lower, medial and lateral fornices.

Grade IV: Socket is characterized by the loss of all the fornices and reduction of palpebral aperture in horizontal and vertical dimensions.

Grade V: In some cases, there is recurrence of contraction of the socket after repeated trial of reconstruction.

This is an excellent format for classification from an ophthalmologists point of view. As Ocularists I believe some minor changes to these classifications would suit us better. Nevertheless, since we have a format, I suggest we try to follow it. Certain clarifications however must be made. Grades **III** and **IV** are very similar (loss of all fornices), but the distinction is made as to the loss of the palpebral aperture or a diminished fissure. It's been my experience that if all fornices are contracted, you almost invariably have a diminished palpebral fissure. Grade **V** makes no attempt to characterize the condition of the fissures, only to say that recurrence of contraction has occurred post-operatively.

For convenience sake let's assume that Grade **V** represents loss of all fornices due to contraction post-operatively. This indicates surgery was done in the last year and an unsuccessful result was achieved. If nothing is done to this socket surgically or prosthetically to correct this situation after one year, it should be re-classed as a Grade **IV**. I believe this to be more accurate due to the fact that invariably a Grade **III** or Grade **IV** socket has often had previous surgical repair attempts. Therefore the classification of Grade **V** truly indicates a recent foiled attempt at socket reconstruction. I believe this to be an important differentiation due to the fact many surgeons will opt to wait a specific period of time before a second attempt at full reconstruction would be made.

OCULARISTS APPROACH TO CONTRACTED SOCKETS

The ocularist has only his imagination to limit him in his ability to manage contracted sockets. However, for convenience sake we will concentrate on those designs that focus pressure on the contracting socket. There are two situations with which we, as ocularists, are usually faced. One is what I refer to as a **"PASSIVE"** socket. This includes all classifications from **O** to **IV**. Class **V** sockets however are still undergoing, or have potential, to still contract, due to the disruption of the socket from surgical intervention. These circumstances where contraction is apparent or potential I refer to as **"ACTIVE"**. All class **V**'s are considered **active**. This is not to say that you cannot have an **active** case in any of the other classes. Quite the contrary, this is highly possible. Usually I consider a **passive** case as one in which a patient has not had work done on his or her prosthesis for some time. This could be at least one year after their last surgery, and in most cases many years. If you notice the socket to be stable and no therapy is being conducted to rectify this situation, then clearly it is **passive**. Depending on the classification and degree of difficulty in achieving a design for a conformer for this socket, I believe the first mode of approach should be to start with the potential expansion of the soft tissue with some sort of pressure device. It is imperative to make the best attempt possible at this stage. To just assume that the only road to success lies with surgery in my opinion is defeatist. This is not to say that with experience you can't recognize those cases that would not be successful. In my personal opinion these cases would have to be at least a class **IV**. In acceptance of this opinion then you must be **active** with a class **I** to **III** pre-operatively, if you intend to give your patients the best possible alternatives and treatments in the management of contracted sockets. I must admit that it is best to discuss this scenario with the prospective surgeon before you start. I believe he must understand that if you are successful there may be no need to reconstruct this orbit. Again we come back to the concept of understanding the realistic

goals from both the patient, the surgeon and the ocularist. It's been my experience that retention and confidence of this retention usually ends up being the common denominator. If you are successful you have averted a potential difficult situation for your patient. If however you are not successful in therapeutically redesigning the orbit to retain a prosthesis, do not despair. From this experience you will have gathered a tremendous amount of understanding of the dynamics of this individuals socket, or sockets. I believe this will help you when you discuss the matter with the surgeon. You may be able to narrow down or identify the particulars of complexities. Therefore, allowing the surgeon to alter his approach may not have been either enough or too much to correct this socket. Either way you have brought a greater understanding of the dynamics of this case to light.

Once the decision to become involved in this case either pre-op, in the O.R. or post operatively you have a wealth of options available to you. Since many of the pre-op management techniques are one and the same, lets first discuss the ability to assist your patient and surgeon from the surgical point of view. In the history of contracted sockets I discussed the use of Dr. J.N. Harringtons design for contracted sockets. It has been my personal experience that this design allows the patient the best potential for correction. One of the major reasons I believe in this design is because I custom make each one for each patient. This, in my opinion, allows us to impart our knowledge and understanding of the complexities of fitting a prosthesis as we envision what the needs of this patient to be. Using a pre- designed device forces the surgeon to design the socket for the device. I strongly believe you should design the device for the socket, not the socket for the device. In most cases I design at least three variations of the design for the surgeon. Some are larger, some smaller and they may possibly extend into an area deeper than we envision. What must be done is to discuss the game plan with the surgeon and understand what his needs may be. Allowing for variations in size only enhances the possibility

of success. This allows for potential changes that might become apparent only at the time of surgery. Be prepared! As previously mentioned, the surgeon has a variety of options available to him to reconstruct the socket. However if he decides to not use some type of conformer or rigid design during surgery, make sure that when the device he is using is to be removed, he either be supplied with a series of conformers or you are available to put one in right away. If you are going to lose several hours before a custom conformer can be put in, chances are you and the patient are going to lose. I cannot stress this point enough! A conformer must be put in immediately.

Once the surgery is over and a conformer is being worn, do not let your guard down. I have seen the most perfect text book cases post-operatively degenerate into a contracting night mare, months after surgery. Sometimes it's as innocent as taking the conformer out to clean it by the patient and then not being able to reinsert it. This usually results in several hours or even days before they end up back in your office to try and refit them. Be preemptive in these situations. First, always make sure the patient has a back up conformer that is slightly smaller that the one being used. This may have been from the last fitting or one you make for them specifically. Second, the patient must be fully instructed in how to deal with these situations. If your patient does not know how to counteract these conditions, your chances of success diminish. Normally I supply these patients with not only a back up conformer, but I also use a C.T.D. that has had the stem cut back. I show the patient how to position this device as well as how to tape it in. If the patient starts to experience contractions, they are your
first line of defence. The key to success has always been a team approach. The patient must become **active** in their therapy.

Ocularists usually use a device with which they are comfortable when dealing with contracted sockets. We have all seen a variety of designs that can enable us to manipulate soft tissue with the prospect of creating or maintaining fornices that will enable the patient to retain his or her prosthesis. Some of the devices that have been used and some still being used by ocularists are listed below.

a) Mechanically Expanding Conformer
b) Dumb Bell Conformer
c) Progressive Size Conformer
d) Spring Expanders
e) Hydrophillic Expanders
f) Pressure Conformer
g) Expansion Prosthesis
h) Lafuente Pressure Mask

Recently a different device was presented to us in the 1996 Mid Year meeting in Arizona. The device which I refer to as a pressure mask was developed by Henry Lafuente. It's been my personal experience that this device holds great promise. Let me first explain some of the more interesting aspects of this design. First the concept of the mask enables a stable base from which to anchor the conformer or pressure device. All too often patients utilizing tape have had the tape loosen due to sweat, fall off or were not enclosed properly. The mask allows consistency in the focus of pressure.

I have tried a variation of designs on the conformer to focus pressure. However, I seem to always come back to the use of elastics. It is my belief that the elastics keep an ongoing

fluctuating base of pressure which adapts to the ongoing changes in the socket, thus never losing the pressure as a fixed device or mechanically expanded screw tends to do. There are certain points you must keep in mind when using variations of this device. First: if using this on a grade **I** or **II** socket, then utilizing the pressure bar device may be feasible since fear of contractions in the opposing fornix may be minimal. You must come to grips with the aspect of using a single bar or double bar approach. I have the most confidence in a double bar approach. It goes against my personal experience when therapeutically altering a socket to not control all fornices. Although I must admit it is feasible with the grade **I** and **II** sockets. In all the devices and methods I've used over the years in the control and development of the contracted socket, never have I seen a device that can create a fornix so quickly, within one day. I don't profess to claim that this is permanent. Quite the contrary.

Transient is more likely without proper care and maintenance.

This device is no different when it comes to the approach to patient management. They must be fully instructed how to deal with it. Also again, prepare for contingencies. It is my opinion at this stage in the use of the device, the pressure bar method should be used under close supervision. Until more is known it behooves us to be cautious. What I believe could or should be done is to design a second stent with a conformer as the maintenance device to be worn at night for a minimum six months.

You must always make sure when using a bar design that you follow the fornix accurately. If the bar slips or extends over the fornix, pressure is not being focused properly and can cause problems. Make sure the curvature of the bar fits the fornix accurately. If not, adjust it.

With the recent development of this device I believe trial and error to be our educator. Be careful, and pay attention to detail. For the sake of furthering our education, share your knowledge and experience, enabling us all to benefit from your experiences.