A Pictorial Anatomy of the Human Eye/Anophthalmic Socket: A Review for Ocularists

ABSTRACT: *Knowledge of human eye anatomy is obviously important to ocularists. This paper describes, with pictorial emphasis, the anatomy of the eye that ocularists generally encounter: the anophthalmic eye/socket. The author continues the discussion from a previous article: Anatomy of the Anterior Eye for Ocularists, published in 2004 in the* Journal of Ophthalmic Prosthetics.[1]

Michael O. Hughes
B.C.O.
Artificial Eye Clinic of Washington, D.C.
Vienna, Virginia

KEY WORDS:
anophthalmic, eye/orbit, eyelids, extraocular eye muscles, ocular implant, Tenon's capsule, tearfilm, socket

INTRODUCTION AND RATIONALE

Understanding the basic anatomy of the human eye is a requirement for all health care providers, but it is even more significant to eye care practitioners, including ocularists. The type of eye anatomy that ocularists know, however, is more abstract, as the anatomy has been altered from its natural form. Although the companion eye in monocular patients is usually within the normal range of aesthetics and function, the affected side may be distorted. While ocularists rarely work on actual eyeballs (except to cover microphthalmic and blind, phthisical eyes using scleral cover shells), this knowledge can assist the ocularist in obtaining a naturally appearing prosthesis, and it will be of greater benefit to the patient. An easier exchange among ocularists, surgeons, and patients will result from this knowledge.[1, 2, 3]

RELATIONSHIPS IN THE NORMAL EYE AND ORBIT

The opening between the eyelids is called the palpebral fissure. In the normal eye, characteristic relationships should be recognized by the ocularist to understand the elements to be evaluated in the fellow eye. All "normalized" features described here are, of course, to be modified toward the ultimate goal of achieving a normal appearance in the prosthetic eye. The normal Caucasian eye will be used as a template.

As shown in Figure 1, the opening of the lids in primary (forward) gaze has a normal asymmetry. When the eyelids are open, the highest point (apex) of the upper lid is typically slightly nasal to the center, while the lowest point of the lower lid is slightly temporal. The medial canthus is slightly lower than the lateral canthus. The ocularist must note these positions to

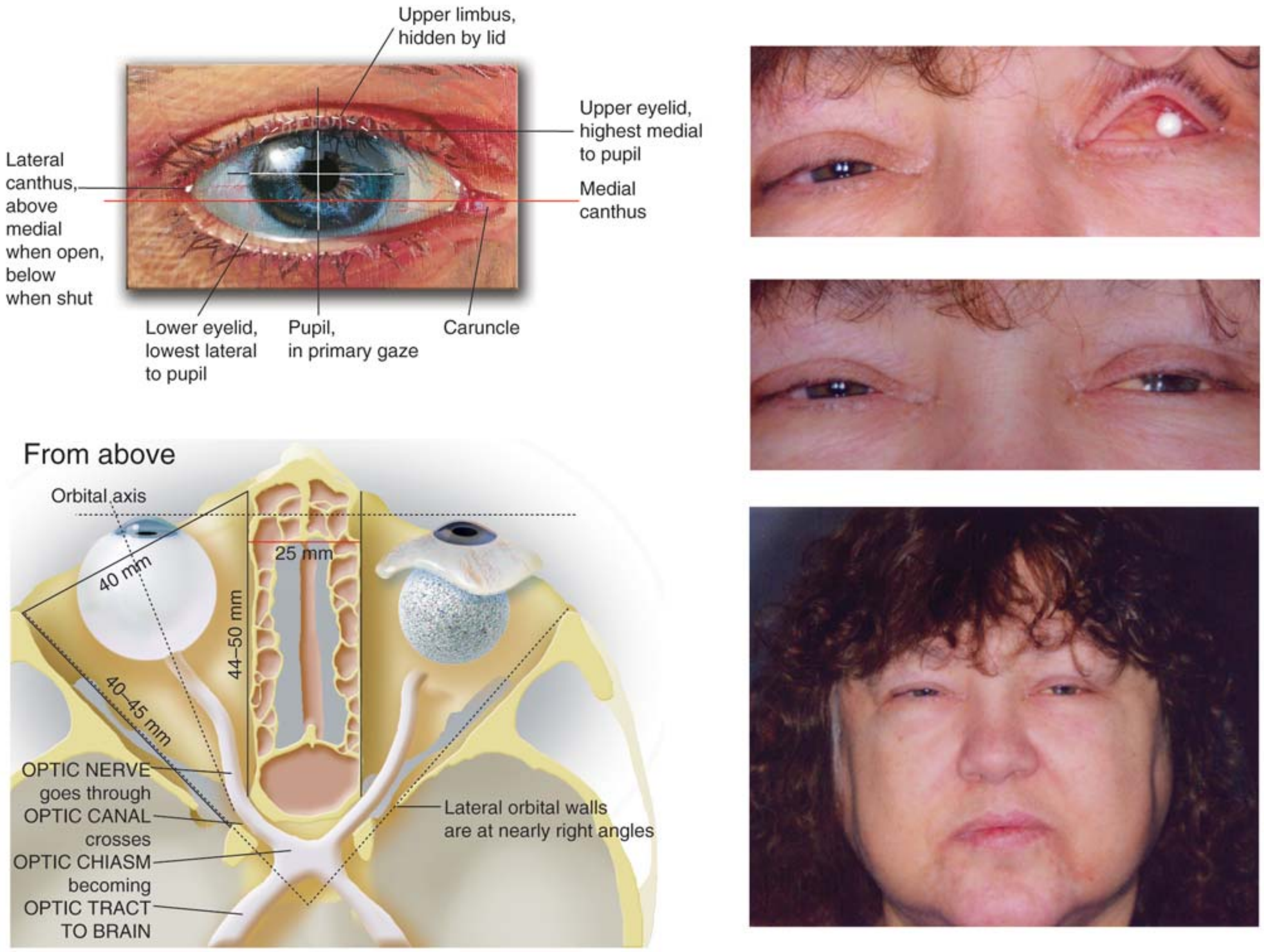


FIGURE 1 Relationships around the eyes. Proportions of the palpebral fissure. From above: Orientation of the orbital walls, EOMs, and normal globe position. The relationship around the eyes for prosthetic eye wearers sometimes includes an ocular implant/motility peg.

adequately duplicate a normal appearance, even if the unaffected eye is wildly asymmetric. In trauma, the prosthesis may become the "normal appearing" eye.[4, 5, 6]

Figure 1 (lower left) depicts the geometry of the orbit from above. Note how anterior the normal corneal apex is in relation to the orbital rims. The position of an average orbit shows the anterior placement of the normal eye. Exophthalmos can be duplicated, although enophthalmos is to be avoided. A shelf or orbital volume-replacing implant as a secondary procedure is sometimes required. Scleral "show" varies with horizontal lid laxity of the lower lid, usually increasing as a patient ages. A child's eye has a generally rounder palpebral fissure and the canthi are often higher. The iris appears relatively large in a child's eye in comparison to the ratio in an adult eye.

From the side, approximately one-third of the eyeball (globe) is outside the orbit at mid-sagittal section. Figure 2A relates normal sagittal anatomy from the lateral view. One can appreciate the thinness of the orbital bones, especially the floor and medial wall, known as the lamina papyracea (sheet of paper) covering the paranasal sinuses.[7, 8, 9]

THE EYELIDS

The eyelids perform several functions for the eye, from distributing tears to protecting the cornea.

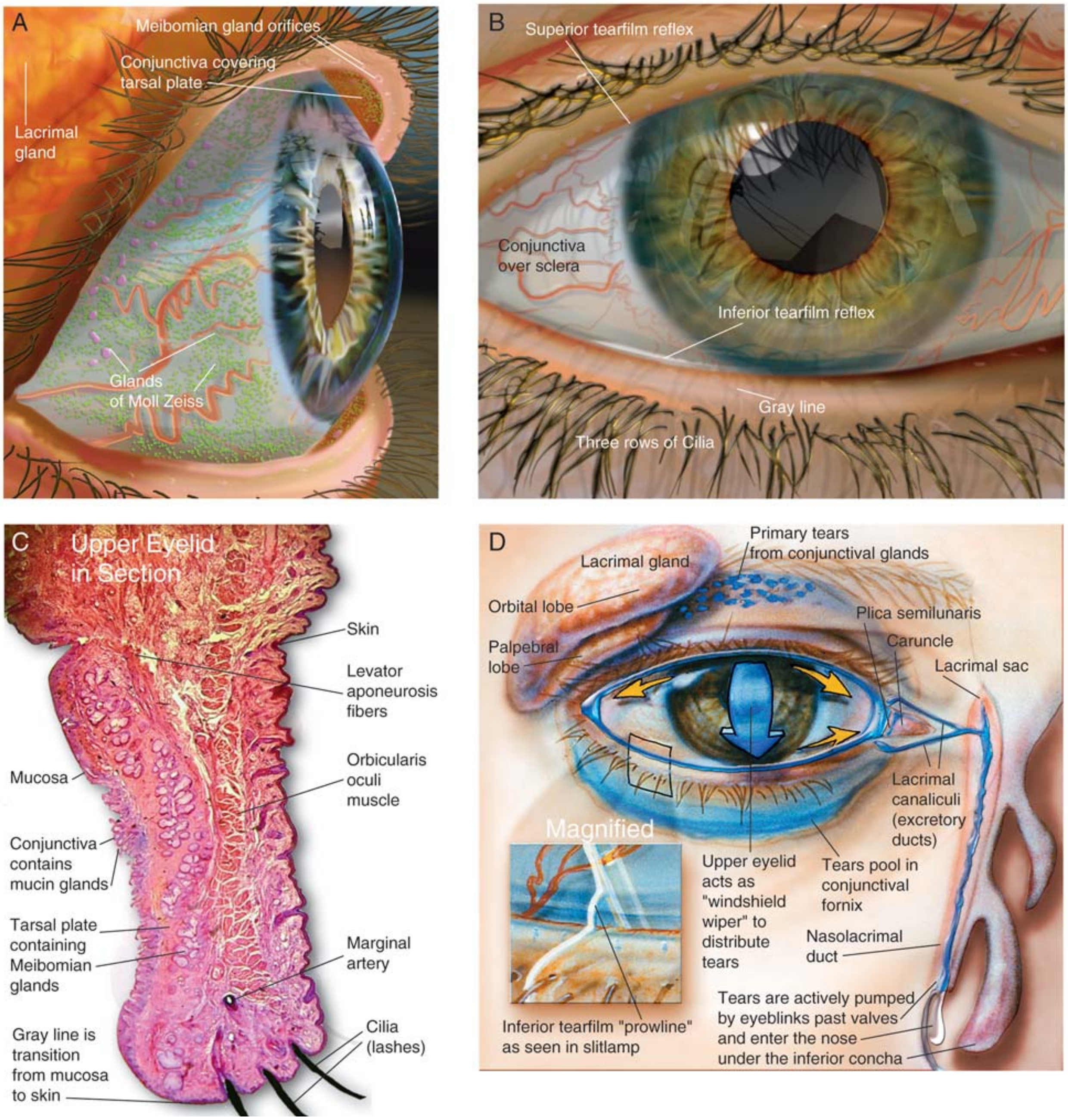


FIGURE 2 Eyelids and tearfilm; lacrimal drainage system. **A.** Glands contributing to the normal tearfilm. **B.** Tears flow over the surface of the eye to exit into the lacrimal drainage system into the nose. **C.** Cross-section of upper eyelid shows tarsal plate and conjunctiva, in this case of giant papillary conjunctivitis (Author's collection, 1893). **D.** Distribution of tears.

Eyelid conformation is central to the look of the most artful ocularistry, and imbalance in the eyelids' appearance can obviate an ocularist's best work. The lid level covering the superior limbus, and, of course, matching the unaffected eye must remain a prosthetic goal. While enophthalmos due to insufficient orbital volume can be addressed by the ocularist or with a surgical orbital implant, the best predictor of post-operative eyelid appearance (as well as implant motility) is surgical technique.

The upper eyelid is raised by the levator palpebrae superioris (LPS) and Muller's (smooth) muscle,

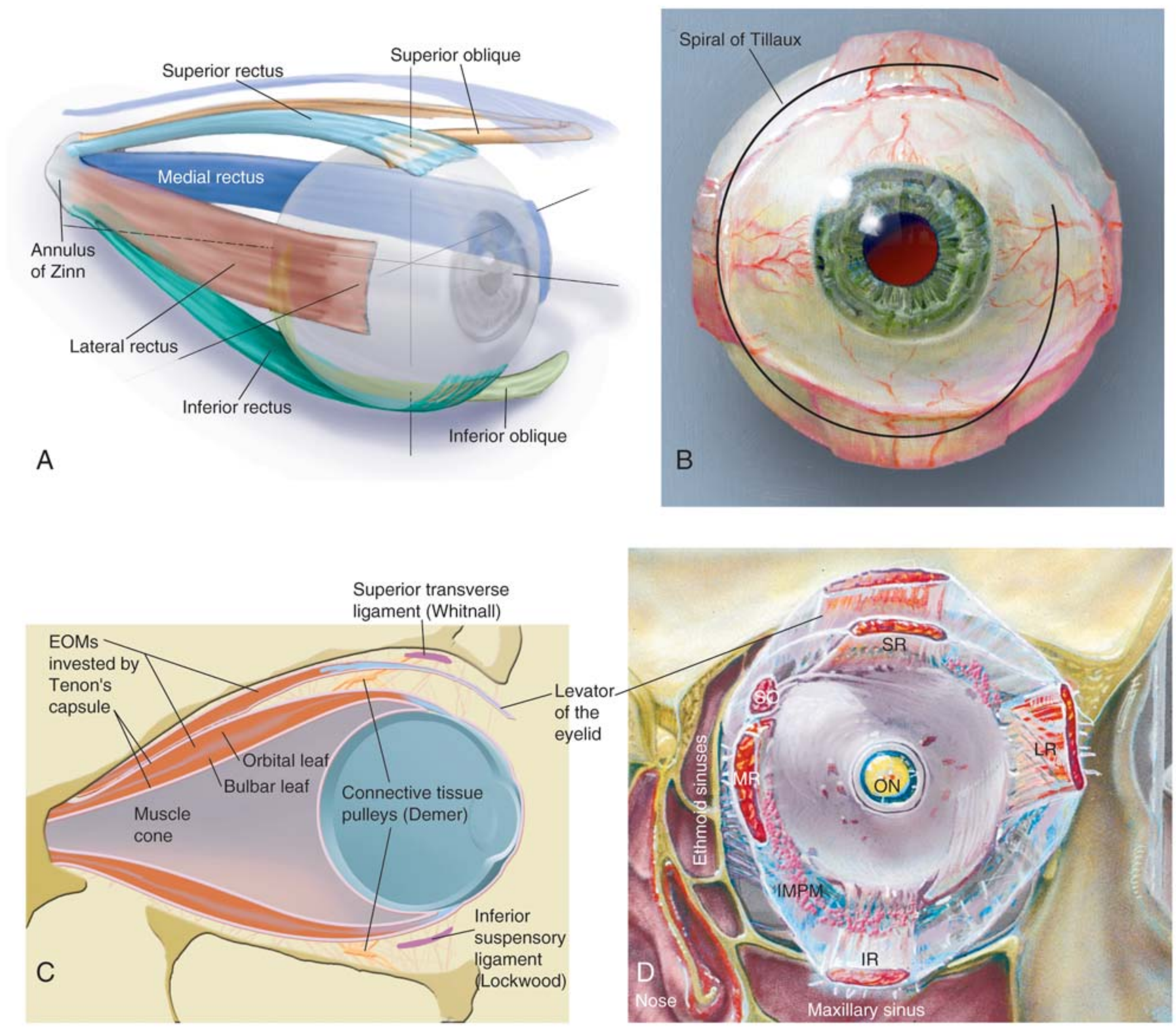


FIGURE 3 Extraocular muscles (EOMs). **A.** EOMS of the right eye viewed from antero-lateral, color coded by their cranial nerve innervation. **B.** Posterior Tenon's capsule around and between the EOMs. **C.** Tenon's capsule and the muscle cone. **D.** Posterior view of muscle cone; Tenon's capsule continues posteriorly adherent to the globe to eventually encircle the optic nerve.

which, while uninvolved with globe movement, are central to eyelid level. The LPS becomes a tendonous sheet (levator aponeurosis) near the equator of the globe and inserts in sheets into the skin of the upper eyelid and the lower third of the upper tarsal plate. It also sends fibers to the conjunctival fornix.[10]

While the third cranial nerve (CNIII) raises the upper eyelid, other nerves influence the palpebral fissure's shape and position. Autonomic smooth muscles operate fine adjustments of the eyelids and conjunctival sac, evidenced best when looking down (lower eyelid retractors). Eyelid droop (ptosis) can signal neurological problems because normal lid height is maintained by these sensitive muscle fibers (Müller's muscle).

Closing the eyelids is performed primarily by the orbicularis oculi muscle that surrounds the eyelids just under the skin. Because the orbicularis muscle is

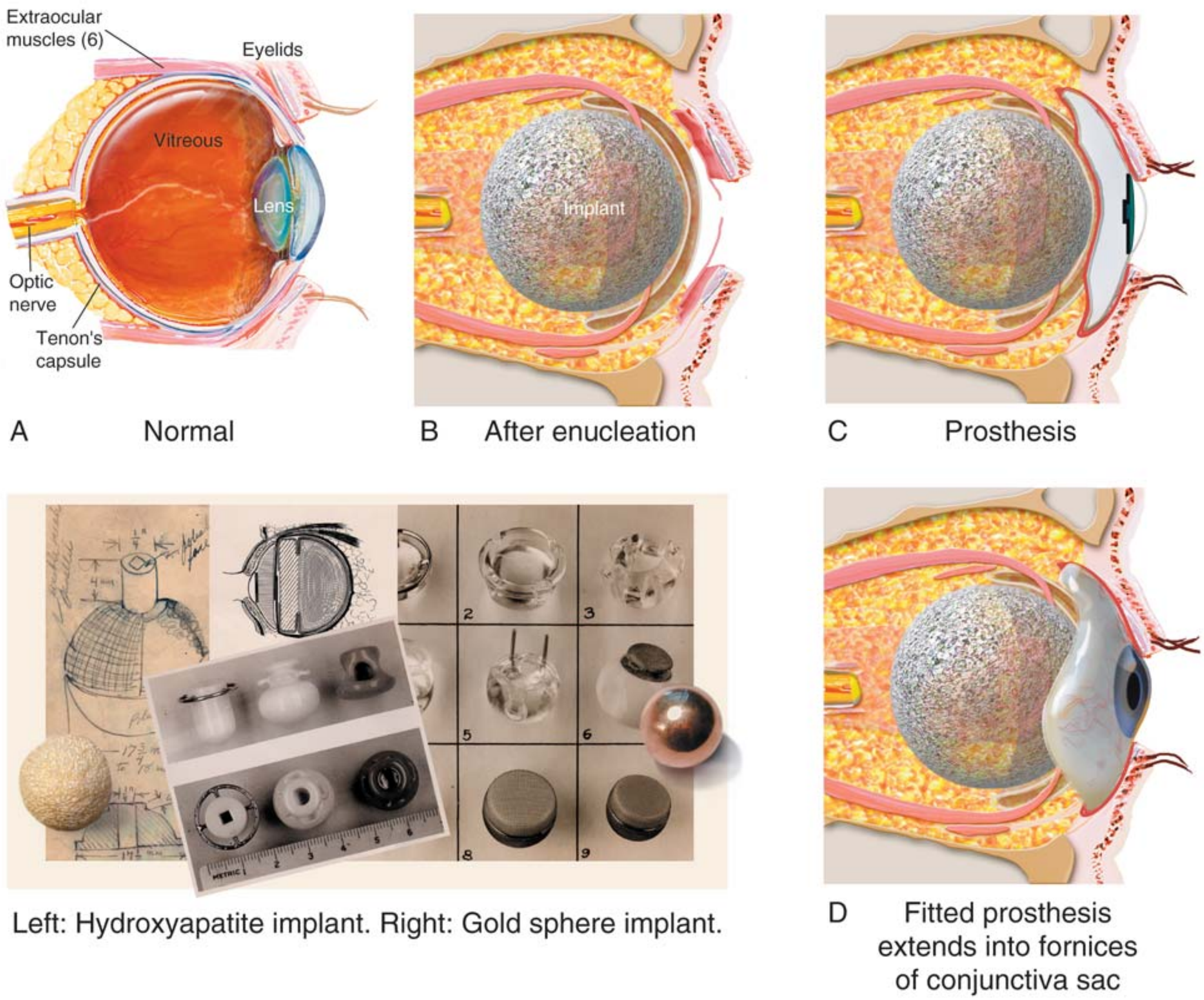


FIGURE 4 Ocular implant. Cross section of the right eye and anterior orbit. **A.** Sagittal section viewed from the side of the eyeball with muscles and fascias attached. **B.** The globe (eyeball) has been surgically removed by enucleation, and a spherical ocular implant is placed behind the posterior layer of Tenon's capsule; the anterior Tenon's capsule and conjunctiva are seen being closed anteriorly. **C,D.** Prosthesis is seen in place, molded from an impression of the conjunctival socket. Lower left shows implants which have had various degrees of success over the last sixty years to seventy years.

innervated by the facial nerve (CNVII) exiting the skull just behind the ear, and traveling across the face near the skin, a patient with an injury to the temple or cheek may have incomplete closure of the eyelids. While this seems nominal, the blink is a readily visible telltale of an abnormal eye, and it must be accommodated in the prosthetic fit. Also, an incompletely closing eyelid will allow more tears to evaporate during sleep (whether over an eyeball or a prosthesis), causing dry-eye and more crusting.[11, 12, 13]

The anterior eyelid margin exhibits rows of eyelashes, the roots of which abut the anterior tarsus. Rarely can an artifical eyelash or tattooed eyeliner have enough variability to appear natural.

The gray line marks the transition of epithelial cells from mucosal in the conjunctiva to exterior skin at middle lid margin. Behind this line are the openings of the Meibomian glands in the tarsal plates, which can be visualized through the translucent conjunctiva upon eyelid eversion. While the fornices of the normal conjunctival sac are only evident on extreme eye movement, their movement in monocu-

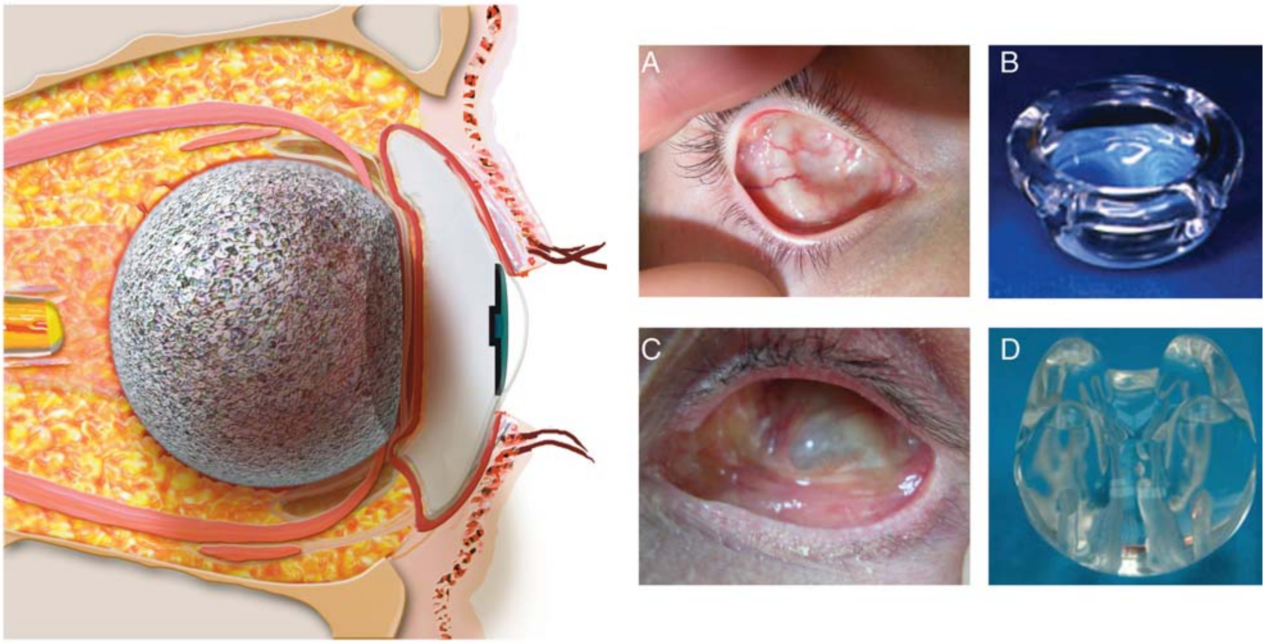


FIGURE 5 Anterior implant contour. If necessary the anterior surface of the ocular implant is manipulated to create more of a physical integration with the prosthesis; as demonstrated by the Allen implant; **A,B,** and the Iowa implant; **C,D.**

lar patients affects prosthetic motility. Ideally, the socket represents the preop sac; muscle and fibrous attachments are preserved as much as feasible.

TEARFILM: SOURCES AND FLOW

Tears are much more complex than mere "salty water." Tears are introduced into the conjunctival sac to sheet over the eye in a tear film and exit the eye into the nose via the lacrimal excretory (drainage) system. The tearfilm works with the eyelids to clean the eye surface (or prosthesis), supply some nutrients to the anterior cornea, and exit with any waste or debris.

There are three elements in layers of the tearfilm: from the eye outward it contains something to help it adhere to the eye (mucus), a wetting element (aqueous), and something to keep it from evaporating (oil). The deepest layer of the tearfilm is composed of a wetting agent produced by goblet cells that allow the tearfilm which is aqueos to form over the otherwise hydrophobic corneal surface. The outermost component of the tearfilm is composed of melbom that acts to delay evaporation from the surface. Melbom is produced by the meibomian gland. The primary tear glands are the lacrimal gland in the upper lateral orbit, the Meibomian glands in the tarsal plates, and glands of Zeis and Moll in the conjunctiva. Normally, the tears pool in the inferior fornix, though a normalized relationship of sac-to-globe or sac-to-prosthesis fit and provides a self-cleaning flow of tears through the system. Reflexive tearing (by emotional crying or irritation) are almost all from the lacrimal gland.[14]

The blinking of the eyelid acts in a "squeegee" manner to distribute tears over the eye surface. (Figure 2D) Lid closure moves from lateral to medial driving the tears to the tear lake where the bulbar conjunctiva meet the caruncle. Slow-motion microphotography has shown that the lids actually push the globe back incrementally, so a near-perfect fit (with an ocular prosthesis) is required as well as a smooth, wettable surface. Lid laxity which results in loss of opposition of the lid to the globe, or abnormal movement can make tears overflow as epiphora (tearing). (Figure 2D)

The septal portion of the orbicularis oculi muscle (OO) actively pumps tears out of the eye by pulling on the lacrimal diaphragm with each blink. The tears exit the eye by small, ductal openings (puncti) that can be seen in the upper and lower lids just nasal to the tarsal plates. Tear fluid is sucked (and passively capillary-attracted) into the canaliculi, past the

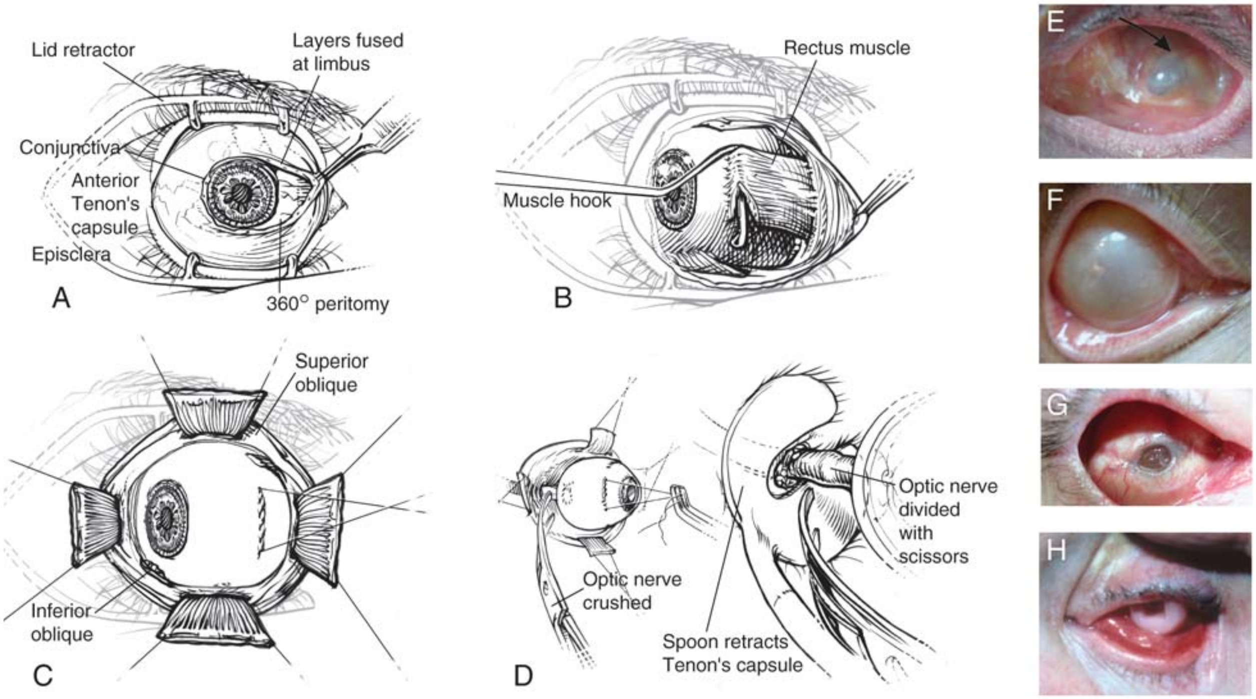


FIGURE 6 Enucleation surgical technique. **A.** A peritomy incision is made 360° around the limbus, freeing the conjunctiva and anterior Tenon's capsule. **B.** The conjunctiva and Tenon's are separated from episclera, and all EOMs are hooked, then divided near their insertions, retained by a double-armed suture for reattachment on the implant. **C.** Traction sutures lift globe while EOMs and Tenon's capsule are retracted. **D.** A slotted enucleation spoon can retract posterior Tenon's capsule, orbital fat, and vessels behind the optic nerve as it is cut. Figures **E** (exposed Iowa implant); **F** (migrated acrylic implant); **G** (dehissence of tissue surrounding implant); **H** (migrated Cutler motility peg) show problems with various implants.

lacrimal diaphragm to the lacrimal sac in the medial orbit, and into the nose via the nasolacrimal duct.

Ophthalmologists and ocularists can assess the in-flow of tears by a tearing test. Various surgical maneuvers, artificial lubricants, tears, and drugs can afford a balance in tear production/removal. The characteristic light reflexes seen on the surface of an eye (or prosthesis) can reveal much about a patient's lubrication (Figure 2B).

EXTRAOCULAR EYE MUSCLES

Controlling the eye's movement are the extraocular eye muscles (EOMs), which originate in the posterior orbit (Figure 3). Six muscles maintain and reposition the eye, while another raises the upper eyelid. The superior, inferior, medial, and lateral rectus muscles, and the superior and inferior oblique muscles are responsible for eye movement (Figure 3).

Rectus (straight) muscles work together to move the eye in the up-down-nasal-temporal directions; the oblique muscles rotate the eye and aid in other motions when the eye is already deviated from primary gaze. The extraocular eye muscles can be categorized by their cranial nerve (CN) innervation (nerve supply). The phrase “LR6SO4 all the rest are Three” is a memory device that means that the lateral rectus (LR) is supplied by the sixth cranial nerve (abducens), the superior oblique (SO) is innervated by the fourth cranial nerve (CNIV, trochlear), and all the rest are supplied by the third (CNIII, oculomotor) nerve.

Tenon's capsule is a membranous anatomical structure that envelopes each extraocular eye muscles as well as the eyeball and optic nerve to form a cone-shaped unit (muscle cone). This structure is named after Jacques-René Tenon (1724–1816), a Paris pathologist, surgeon, and oculist. (Figure 7) Tenon’s observations and descriptions are eponymously recognized in “Tenon’s capsule” and “Tenon’s space.” It is interesting to note that Tenon was an octogenarian

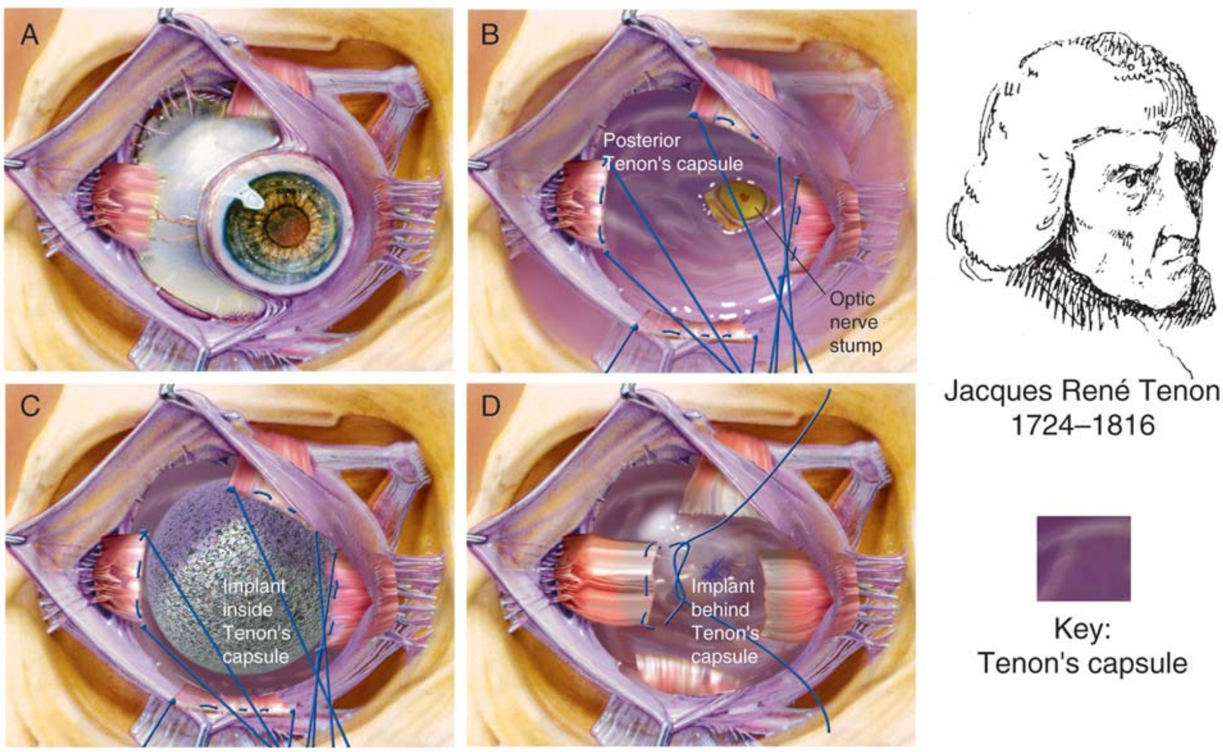


FIGURE 7 Implant placment and posterior Tenon's capsule. **A.** Implant placement in enucleation and evisceration. **B.** Anatomy at the end of enucleation surgery, the implant is seen being covered by anterior Tenon's and conjunctiva. **C,D.** Implant in place.

when his major ophthalmological writings were published. Together with other fibrous septi and structures, Tenon's capsule aids in suspending the orbital structures and redirecting the pull of muscles in the manner of pulleys. This is most evident in Figures 3C and 3D (from behind). Its surgical relevance is shown in Figures 4, 5, 6, and 7.

SURGICAL REMOVAL OF THE EYEBALL

While evisceration, enucleation, and exenteration all remove eye tissue, enucleation remains the most common. Enucleation is the removal of the eyeball proper. We will briefly mention evisceration (removal of eye contents only) but omit exenteration, since only an external prosthetic appliance (orbital with ocular prosthesis) can address disguising the removal of the entire orbital contents.

Enucleation

After a retrobulbar injection (behind the eyeball) of anesthetic, an incision around the limbus (peritomy) opens the conjunctiva and anterior Tenon's capsule (Figures 6A and 7A). The extraocular eye muscles are isolated in turn with a muscle hook (Figure 6B), tagged with sutures, and released from their insertions into the globe with the exception of the oblique muscles, which are simply cut (Figure 6C). The optic nerve is cut (Figure 6D), and the entire eye is removed.

Tenon's capsule is inspected (Figure 7B and 7C) for closure without tension. The spherical implant is measured and inserted. Its placement varies by surgeon and patient, using different sized implants. Generally, a smaller implant is used when it is placed within Tenon's capsule or wrapped in another material before placement. In order to enhance the tissue anterior to the implant, the implant is often placed behind posterior Tenon's capsule (Figure 7D).

Proper sizing of the implant is crucial. Too small an implant will cause possible migration, enophthalmos or a deep sulcus. Too-large an implant and pressure on the front of the implant may increase the risk

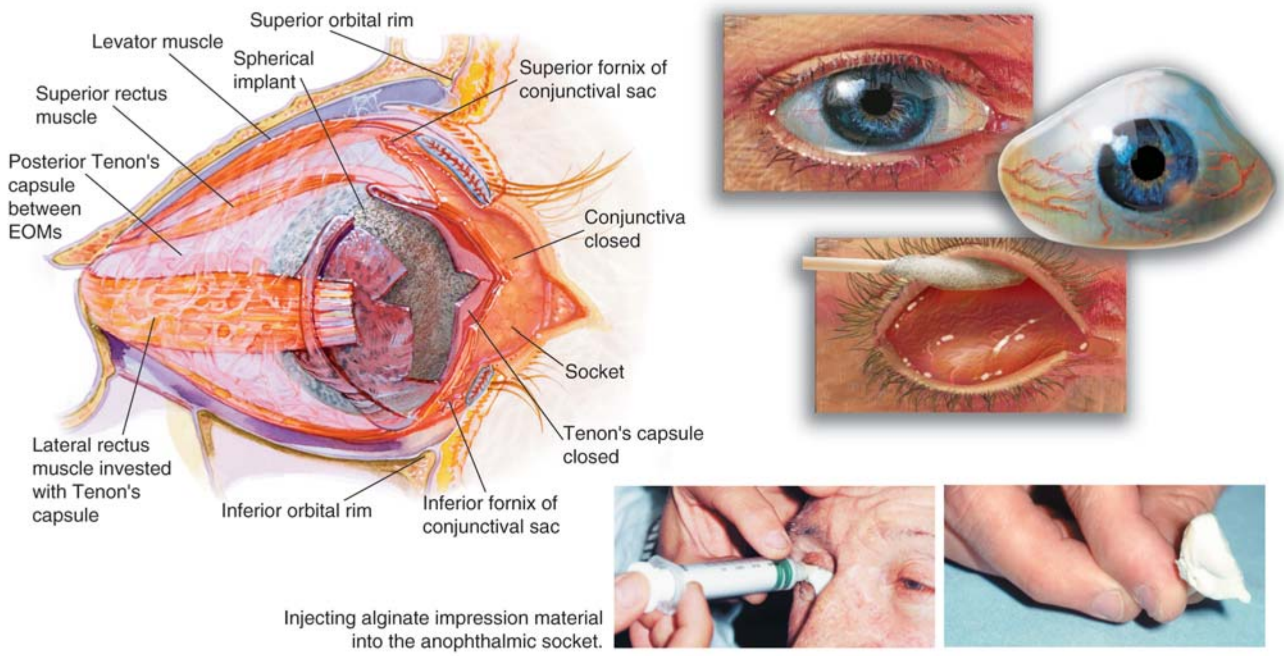


FIGURE 8 The anophthalmic socket. Key anatomical landmarks of the socket. Moist normal eye; Anophthalmic socket; Prosthesis. Alginate impression of the (anophthalmic) socket.

of wound dehiscence, erosion or implant exposure, and infection. It is ideal for the ocular implant to provide 65%-70% of the volume of the (lost) eye with the remaining volume (30%-35%) being the ocular prosthesis.

The extraocular eye muscles are either attached to the implant or cross-sutured, and the anterior tissues (Tenon's and conjunctiva) are closed without tension. Antibiotics are applied via ointment, injection, and/or intravenous infusion. An acrylic conformer is often placed in the socket, and a firm dressing applied for the first week. Often, the patient is ready for the fitting of a custom prosthesis after 6 weeks to 8 weeks.

According to the American Academy of Ophthalmology, two of the more difficult challenges for ophthalmologists and ocularists are working with superior sulcus deformities and ptosis of the lids (Figure 9).[15, 16, 17, 18, 19]

While careful observation is always expected to evaluate the socket for adequate healing, many socket irregularities are discovered (only) upon obtaining an impression of the anophthalmic socket. (Figure 8 lower portion) Lee Allen's alginate impression reports detail the role of the ocularist and taking (alginate) impressions for prosthetic restoration.[20, 21]

Evisceration

The surgical removal of the contents of the eyeball alone has several advantages as the muscles may remain intact and disruption of other orbital structures is minimized. However, evisceration is not without inherent risk. If not entirely removed, the remaining pigment cells can incite changes (inflammation) in the fellow eye. As surgical techniques have improved dramatically in the past decade, you may see more of this type of patient in your ocularistry practices.

SURGICAL PLACEMENT OF THE IMPLANT

To be effective, an ocular implant must reasonably reproduce the volume, position, and motility of the natural eye. It must retain a covering suitable for lubrication, and it must not migrate nor extrude. To add thickness in front of the implant, the anterior Tenon's capsule and conjunctiva can be thickened by placing the implant behind the posterior Tenon's cap-

FIGURE 9 Farming and manufacturing accidents during the industrial revolution proved difficult for orbital and prosthetic restoration, as did eye injuries sustained by German (lower right), British (upper right) and U.S. soldiers (lower far right) during WWI and WWII respectively.

sule, sewing-in a scleral cap, or wrapping the implant in a suitable material (fascia, sclera, plastic).

ANATOMY OF THE ANOPHTHALMIC SOCKET

The housing for prosthetic eyes an ocularist sees in daily practice is the anophthalmic socket (Figure 8). After surgery, the socket generally heals in 6 weeks to 8 weeks to a reasonably consistent size, but it may distort if left empty. Therefore, the beneficial post-op conformer is to be replaced as soon as feasible with a professionally-fitted custom prosthesis. A 2-month or 6-month follow–up (regarding the prosthetic fit) is suggested to determine if additional atrophy of the tissue has occurred.

While many patients have exudative mucus in their sockets post-op, these problems usually subside on their own. Sockets that continue to have mucus may have fitting or finish problems with the prosthesis. The first step in eliminating troublesome exudates (including GPC) is to determine their source by an ophthalmologist; the next step is to ensure that fit and finish are optimized by the ocularist.

Other noted concerns regarding socket irritation include adequate curing of the plastics (polymethy methacrylate), although other opinions recommend (cryolite) glass prostheses (used primarily in Germany and Eastern Europe) as a prosthesis more compatible with sensitive mucosa. Joe LeGrand carefully detailed the problems surrounding chronic exudates of (ocular) prosthetic-wearing patients and possible solutions to this problem.[22] This dilemma can also be called the "grey area," for its causes and solutions can often fall between "specialists;" and can be difficult to both diagnose and treat.

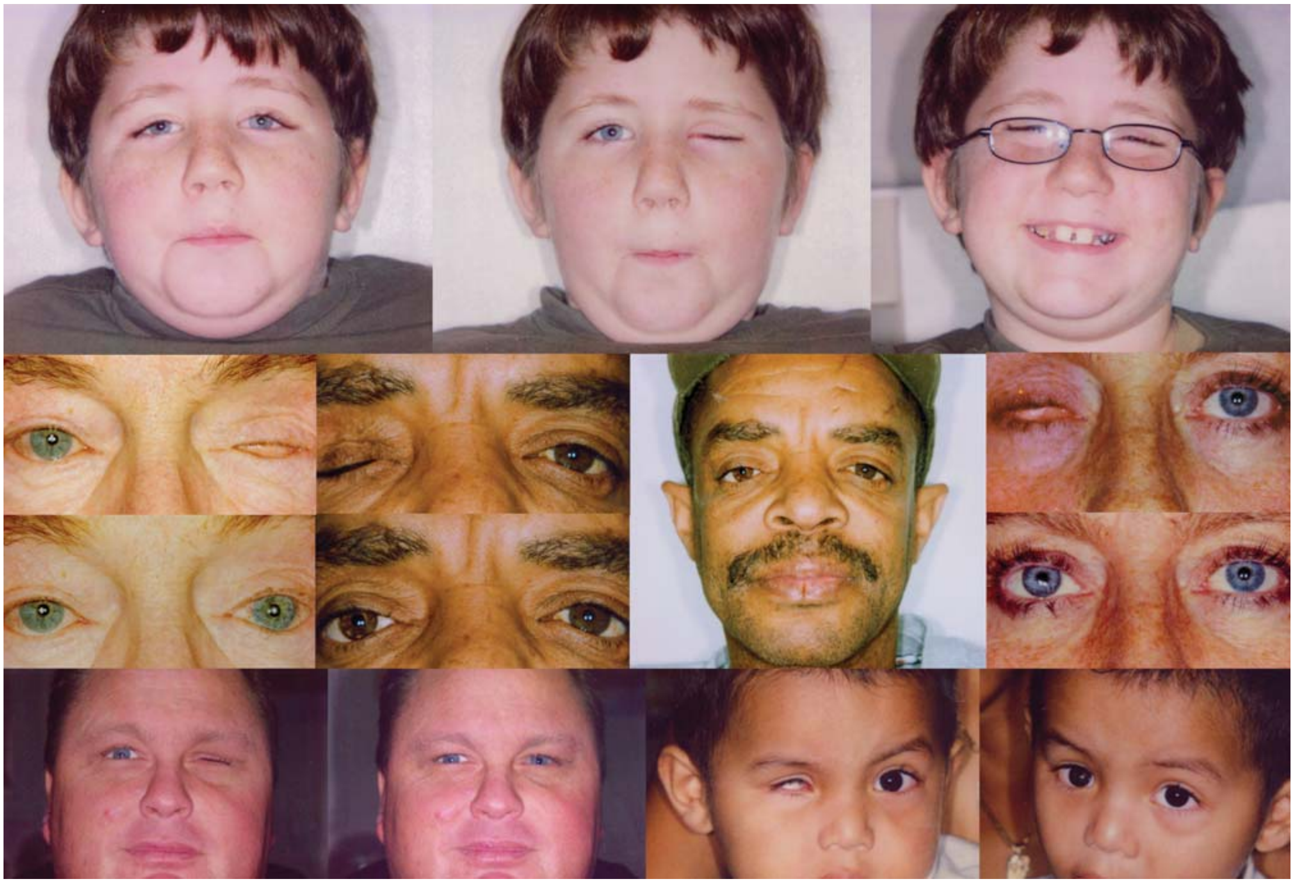


FIGURE 10 This collage represents the refinements in surgical procedures, ocular implants (including materials) and custom ocular prostheses which have evolved in the last sixty years. Collectively, these improvements have greatly improved patient cosmesis and comfort.

The long-term socket prognosis determined by surgical technique and fit and finish of the prosthesis allows for a healthy socket to self-clean and self-lubricate. In the best result, the prosthesis need be removed only "as needed," with many patients leaving the prosthesis in the socket for weeks or months at a time. It has been found that frequent (daily) removal of the prosthesis keeps the anophthalmic socket mildly irritated and risks complications with unsanitary hands or instruments.[23, 24, 25]

The socket can become dry or inflamed if irritants are present or chemicals are introduced. A socket that becomes shrunken must be surgically enlarged, often grafting additional lining tissue into the socket. Expanding and increasing the size of custom-made conformers is another method to care and expand contracted socket. Annual follow – ups to both ocularists and ophthalmologists help reduce the risk of noted complications.[26, 27, 28]

CONCLUSION

Further understanding of the anatomy of the eye and orbit is beneficial to ocularistry. The author hopes that this brief review is useful to ocularists everywhere, and perhaps to the surgeons with whom they work.

The basic and generalized information noted in this paper was generated for an introduction and review. It was not intended for study beyond the scope of ocularistry. The author hopes that the material presented here entices the reader to further exploration, for additional knowledge and understanding can only enhance ocularists' practices, which, in turn, yields an attractive appearance for patients (Figure 10).

ACKNOWLEDGEMENTS

Special thanks to the following people for their critique, critical review, and encouragement. Also, very special thanks to Craig Luce; Certified Medical Illustrator, for his continued artistic insight, expert illustrations and interest in this project. Dr. Barry Zide, Professor of Surgery (New York University Medical Center) considers Craig "the finest ophthalmic artist of our day." The illustrations in this paper reinforce that opinion.

William Deegan, M.D., Ophthalmologist
The Retina Group of Washington, DC
Washington, DC; Arlington, Virginia

Sara A. Kaltreider, M.D., Ophthalmologist
Charlottesville, Virginia

Robert P. Kling, M.D., Ophthalmologist
Falls Church, Virginia

Stephen Newman, M.D., Ophthalmologist
Department of Ophthalmology
University of Virginia
Charlottesville, Virginia

Ted H. Wojno, M.D., Ophthalmologist
Department of Ophthalmology
Emory University
Atlanta, Georgia

Jeffrey Zuravleff, M.D. Ophthalmologist
Richmond, Virginia

Clyde W Andrews, B.C.O.
Richmond, Virginia

Howard Bartner (Retired), Chief of Medical Illustration
National Institutes of Health
Bethesda, Maryland

Jim Willis, B.C.O.
LeGrand Northwest
Edmonton, Alberta; Canada

The Figure 5 photographs were used with permission from Francois Durette, Board Certified Ocularist, Montreal, Quebec; Canada.

Illustrations in Figures 2D, 3D, and 7A are taken from the book: *Surgical Anatomy of the Orbit* (1985) by Glen Jelkins, M.D. and Barry Zide, M.D. They were used with permission from the publisher, Lippincott, Williams and Wilkins. Thank you to Senior Executive Editor Jonathan Pine of Lippincott, Williams and Wilkins for securing these beautiful illustrations for usage in this article.

Color illustrations of these and other anatomy of the eye related to ocularistry can be found on the website: www.artificialeyeclinic.com

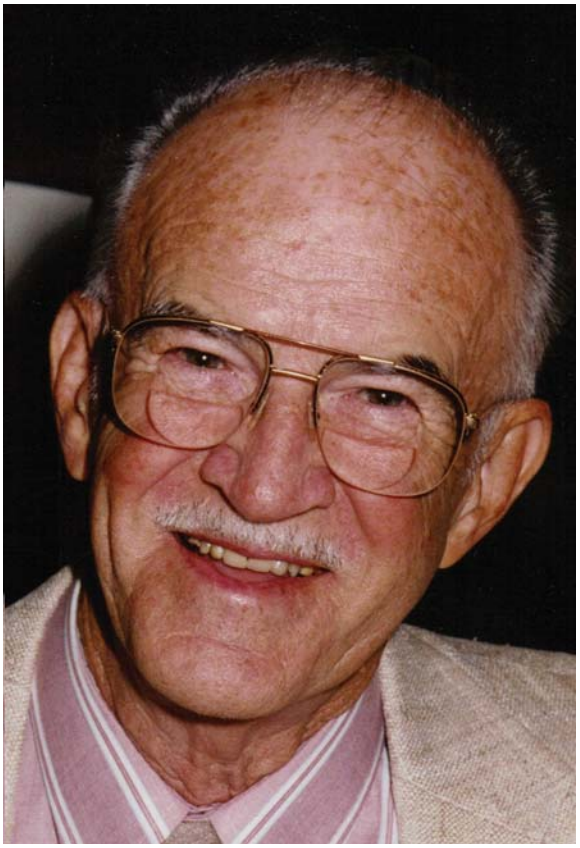
REFERENCES

1. Hughes MO. Anatomy of the anterior eye for ocularists, The Journal of Ophthalmic Prosthetics, 2004, 25-35.
2. Hughes MO, Luce, CA. Depicting the anterior aspect of the human eye in two and three dimension, part one: cornea and pupil, Journal of the Association of Medical Illustrators 2005; Volume 31, Number 1.
3. Hughes MO, Luce CA. Depicting the anterior aspect of the human eye in two and three dimension, part two: iris, limbus and sclera, Journal of the Association of Medical Illustrators, 2005; Volume 31, Number 2.
4. Warren LA. Basic Anatomy of the Eye for Artists, The Journal of Biocommunications (JBC)1988, 22-31.
5. Instruction Booklet, Valley Forge Plastic Artificial Eye Program, Office of the Surgeon General, U.S. Army, Washington, D.C., September, 1944.
6. Erph SF, Wirtz MS, Dietz VH. Plastic artificial eye program, US. Army, American Journal of Ophthalmology, 1946, 29: 984.
7. Wolf E. *Eugene Wolf's Anatomy of the Eye and Orbit,* W.B. Saunders Company, 1933. Seventh Edition, 1976.
8. Zide BM. *Surgical Anatomy Around the orbit (The System of Zones),* Lippincott, Williams and Wilkins, 2006.
9. Zide BM, Jelks GW. *Surgical Anatomy of the Orbit,* Raven Press, New York, 1985.

10. Jakobiec FA (ed). *Ocular Anatomy, Embryology, and Teratology,* Harper and Rowe, Philadelphia, 1982.
11. McCord CD. and Tanenbaum M. (Editors) Oculoplastic Surgery, Raven Press, 1987.
12. Bosniak SL , Smith BC. (eds) *Advances in Ophthalmic, Plastic and Reconstructive Surgery (the Anophthalmic Socket),* Pergamon Press, 1990.
13. Callahon MA, Callahan. A. *Ophthalmic Plastic and Orbital Surgery,* Aesculapius Publishing Company, Birmingham, Alabama, 1979.
14. Department of Anatomy University of New South Wales, Sidney, Australia. www.fluorideaction.org; accessed February, 2007.
15. American Academy of Ophthalmology: Basic and Clinical Science Course: Orbit, Eyelids and Lacrimal System, Section 7, 2003–2004. The Anophthalmic Socket 119-127.
16. Thomas R. Deformities following enucleation, The J American Society of Ocularists, 1977, 3-6.
17. Soll D. Complications of enucleation surgery, The J American Society of Ocularists. 1977, 7-9.
18. Barr D. Extruding Iimplant—surgical and ocularist correction, The J American Society of Ocularists, 1977, 10-11.
19. Hornblass A. Superior sulcus depression and enophthalmos in the anophthalmic socket, The J American Society of Ocularist, 1980, 3-8.
20. Allen L. and Bulgarell DM. Obtaining and understanding the alginate impressions, The J American Society of Ocularist. 1988. p 4-13.
21. Allen L, Webster HE. Modified impression method of artificial eye fitting, American Journal of Ophthalmology, Vol. 67, No. 2, February 1969.
22. LeGrand JA. Chronic exudate: an unnecessary evil, J American Society of Ocularist, 1980, 22-25.
23. Allen L Bulgarelli EM, Bulgarelli DM, Hansjoerg KE. Artificial Eyes and Tear Measurements 1, J American Society of Ocularists, 1981, 26-31
24. Galeski JS. *Galeski Laboratories Prosthetic Eye Fitting Manual. Iris Patterns*. Richmond, Virginia, 1950.
25. Prince, JH. *Ocular Prosthesis,* E & S Livingstone, L & D. Edinburg, 1946.
26. Prince JH. *Recent Advances in Ocular Prosthesis,* E & S Livingstone, L & D., Edinburg, 1950, Oculoplastic Surgery
27. Guibor P, Gougeman H. *Problems and Treatment of Contracted Sockets, Exenterated Orbits and Alkali Burns.* Volume 1. Intercontinental Medical Book Corporation, New York; 1973.
28. Guibor P, Gougelman H. *Problems and Treatment of Enucleation, Evisceration and Exposure.* Volume 2. Intercontinental Medical Book Corporation, New York; 1973.

CORRESPONDENCE TO:

Michael O. Hughes, B.C.O.
Artificial Eye Clinic of Washington, DC
307 Maple Avenue West, Suite B, Vienna VA
22180-4307
Email: Eye226@aol.com
www.artificialeyeclinic.com



In Memoriam

Bernard “Ben” Maloney died February 27, 2007 in Lake Oswego, Oregon. He was 88 years old. Ben was born in Medicine Hat, Alberta, Canada and moved to Oregon with his family at the age of three. In 1942, while still a Canadian citizen, Ben enlisted in the U.S. Army and became a surgical and dental technician.

At the conclusion of World War II, Ben was selected by the Veterans’ Administration to be trained as an ocularist and anaplastologist. After completing his training at the Medical School of the University of Baltimore, He returned to Portland, Oregon, serving as Chief of the Restoration Clinic at the Veterans’ Hospital until his first retirement in 1974.

Enticed by both ophthalmologists and his former patients, he forsook retirement and returned to ocularistry entering into private practice. His daughter Maureen joined him in the field in 1976. Around the same time he became very actively involved in the American Society of Ocularists, eventually serving as President (1985–1986). Ben treasured the friendships developed in the society and traveled several times to visit other ASO members. Throughout his final years he continued to enjoy his favorite sport, golf, as well as gardening and spending time with his family.

Throughout Ben’s life, his sense of humor and compassion combined with that ever present twinkle in his eye, entertained everyone in his circle and brought joy and laughter to all.