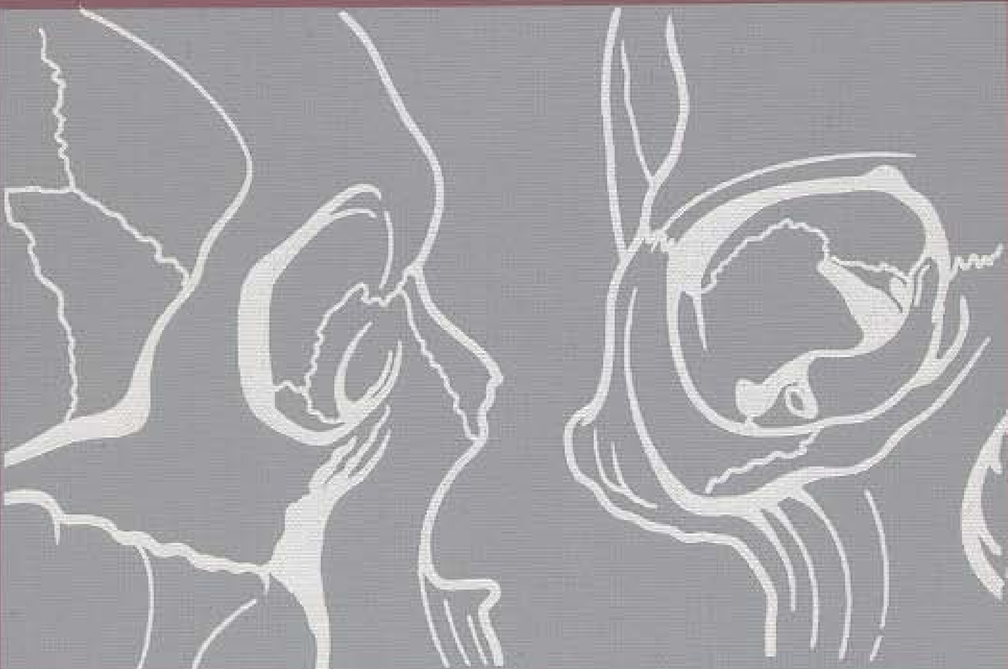
ORBITAL SURGERY

A CONCEPTUAL APPROACH



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Contents

Foreword

While there are many textbooks that one can consult on orbital diseases, none has been organized or executed with the artistic flair displayed by Jack Rootman and Bob Goldberg, along with their medical illustrator, Bruce Stewart. This volume is basically three books in one: an overview on orbital diseases, an anatomical atlas, and a surgical atlas. The illustrations are absolutely elegant; the compression and sharp-edged accuracy of the clinical principles and approaches are the distillate of first-class minds that have been extremely well trained and that have been immersed in an extraordinary spectrum of orbital cases and surgeries. This textbook is a panopticon that opens new conceptual vistas and anatomical spaces and is *sui generis.*

It is a privilege to be able to write a brief appreciation of an effort that has been so obviously lovingly put together by two colleagues one knows, likes, and respects. Jack Rootman did a postresidency fellowship with the late Robert Ellsworth at the Edward S. Harkness Eye Institute in New York City when I was a resident in surgical pathology at Columbia-Presbyterian Medical Center right after I completed my residency in ophthalmology at the Eye Institute. It was clear to me then, as it is now clear to all of his colleagues nationally and internationally, that Jack is endowed with incredible dollops of energy and intellectual talent and that he would eventually make a major impact in his chosen field of oncology/orbital disease. After completing his fellowship in orbital surgery with John Wright of London, he returned to Canada, and has risen to the apogee of his profession in that country by amassing a rich and unique surgical practice and by leading his academic department as Professor and Chairman.

Bob Goldberg is also an exceptionally gifted and original worker dedicated to solving problems in orbital diseases and ophthalmic plastic surgery. I met him in New York at the Manhattan Eye, Ear and Throat Hospital where he studied with the late Byron Smith, as well as with Robert Della Rocca, Albert Hornblass, and Richard Lisman. Bob also spent time with Jack Rootman in Vancouver, and has since developed a fine academic service at the Jules Stein Eye Institute at the University of California, Los Angeles. A textbook of this type could not have emerged without going through the alembic of their combined clinical and intellectual experiences. Anyone with more than a passing interest in orbital disease will find this an indispensable volume to consult and a most pleasurable one from which to learn. Given my own publication forays, I am aware of the authors' unstinting expenditure of energy on this project, and therefore I salute these estimable colleagues for their scholarly success and invaluable contribution to our field.

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Preface

Surgery of the orbit is a distillation of surgical and pathologic experience, forged into a unique, visual learning tool that represents the confluence of the major interests in my professional life, that is, patient care, pathology, surgery, and art. This book was a labor of love. After completing an earlier text, *Diseases of the Orbit,* I thought I would never write another book. Soon after, I realized that much remained unsaid, particularly about visualization in surgery. In the process of doing our earlier book, Bruce Stewart and I had enjoyed hundreds of hours working on the development of illustrations and had conceptualized a model for understanding orbital anatomy and surgery within the context of "boxes" or defined anatomic spaces. Further, we had worked from the surgeon's view as opposed to an anatomic perspective and employed visual tools that allowed for conceptualization of spaces within surrounding structures (i.e., transview).

The foundations of this book are based on 20 years of thoughtful surgical exploration with students at my side and, in the background, excellent local diagnostic, ophthalmologic, surgical, and nursing teams.

As a surgeon and artist, I have been struck by the similarity in mental processes characterizing these disciplines. Surgery is a right brain activity (visual, creative) interdigitated with logical or left brain activity. In fact, artistic and surgical discipline~ are frequently shared historically by surgeon-artists.

Another aspect of surgery is recognition that the identification of pathologic change is a dynamic process that requires careful observation before, during, and after surgery. Therefore, we have tried to emphasize pathologic change both from an investigative point of view, and within the surgical environment by linking the drawings to actual cases seen at the University of British Columbia ocular and orbital clinics from 1974 to 1994.

The book is constructed to give a rich, visual engram with regard to normal and abnormal anatomy affected by pathologic conditions. It reflects our joint commitment to visualization, and especially to the excellent artistic skills of Bruce Stewart. Bob Goldberg did a fellowship with me in the late 1980s and impressed me with his intense commitment to contemplative care and to understanding anatomy. It was without hesitation and with satisfaction that I asked Bob to participate in this endeavor. We approached this project with energy and joy, defining and refining our views, fascinated by the dynamic nature of visual discovery. We were all impressed by how one's concepts change even while writing and drawing, which emphasizes that surgical techniques are evolutionary and dynamic. Our task has been to share our experience with other surgeons in order to help them to adopt the disciplines described herein and to better serve their patients.

Jack Rootman, M.D.

This book is about art and surgery. Jack Rootman is a gifted surgeon and artist. Bruce Stewart is a remarkable artist who knows the orbit so well that he can do surgical cases in his mind. I marvel at the ability to transfer an image from mind to paper. As a surgeon, I am qualified to state the opinion that this book will convey the sense that surgery is most beneficial to the patient, not to mention most rewarding for the surgeon, when it is approached as an artistic, creative endeavor.

Surgery must not be rote. Every disease, every case, every patient is different. Surgery begins with and is founded on an intellectual exercise that combines encompassing knowledge of clinical disease with the skillful collection and analysis of data from history, physical examination, and investigation. The performance in the operating room is more dramatic but in many ways less important than preoperative thinking and planning. Of critical importance, much of the art and satisfaction of surgery stems from the caring, human interaction that establishes and maintains the doctor-patient relationship.

Finally, at the time of surgery, the surgeon has the opportunity to be a performing artist. He or she draws on intellectual resources, including knowledge of anatomy, physiology, and surgical pathology, and applies these in a creative way to the problem at hand, prepared at all times to change course or even invent a new operation if the need arises. The privilege of participating in this tactile, intellectual, and creative enterprise, to be an explorer in the fascinating natural world of the orbit, and to wonder at the endless variations of the effects of disease processes on tissues, all in the context of helping patients, is a powerful thing indeed.

We have tried in this book to present not so much a catalog of procedures or an extensive treatise of technologic points but rather a visual work that captures the excitement of orbital surgery and emphasizes its intellectual foundation. This book will serve as a starting point for a flexible and imaginative approach to be molded and expanded by each surgeon. In this way, all surgeons have the chance to be artists, not only the occasional Da Vinci, but also all of us frustrated ones.

Robert A. Goldberg, M.D.

In an attempt to clarify the great complex of structures of and surrounding the orbit, we have adopted a number of artistic devices in our drawings. Some of those included follow and may be of interest to the reader.

In Section II on orbital anatomy, we have chosen operative viewpoints in three surgical planes, namely, lateral, anterior, and superolateral. These and their variations are used throughout Section III on orbital surgery as well.

In order to help clarify an illustration, a see-through or transview approach was taken, thus preserving a more true to life surgical configuration.

Structures in transview have a generally bluish-purple treatment to distinguish them from direct-view structures. For example, periorbital or orbital lesions seen through skin, or deep lesions are treated in this so-called atmospheric perspective.

Windows or sectional cuts are employed to distinguish tissue planes such as those used to detail upper lid structures in the drawings of orbital septa in Section II.

Assigned colors for neurovascular structures employ the traditional red and blue for vessels and yellow and orange for sensory and motor nerves, respectively.

In an attempt to soften the illustrations for the surgical section, we have used more pastel colors with a "skin" color predominating throughout. Bony landmarks are used to orientate the viewer where subtle changes in viewpoint facilitate a better view of a procedure. An example would be in Chapter 11 on orbital decompression, where one looks down the medial wall to the apex, then returns to a more oblique view to show the extent and configuration of removal of bone from the floor.

We tried for a more didactic completeness in Section II and greater simplification of structures where they occur in the surgical field. Because the orbit and related structures are complex in their integral components, a more dramatic sense of foreshortening was used to depict certain structures in wide-angle view in order to improve a sense of three dimensions.

Bruce Stewart, B.F.A.

Acknowledgments

My research assistant, Wilma Chang, organized and collated the statistical data, obtained and reviewed with me all of the CT scans, and photographed and registered all of the clinical data. In addition, the typing of the book and transfer of data between our centers was her responsibility. Many extra hours of dedicated and cheerful effort were put into this enterprise by Ms. Chang, and we are all grateful to her.

With authors in three different centers, we found ourselves regularly commuting for short trips between Vancouver, Los Angeles, and Vancouver Island, usually spending marathon weekends accomplishing our tasks. Needless to say, this could not be done without the commitment and dedication of our families, who put up with the long hours and sometimes enthusiastic discussion that took place during these weekends. Our thanks to our wives, Jenny Rootman and Jan Goldberg, and to Bruce's father, Angus Stewart.

The underpinnings of any surgical discipline are exceedingly important and reflect the fact that this is a team effort. Therefore, we would like to thank our nursing staffs and colleagues in the referring and collaborative disciplines of ophthalmology, neurosurgery, and otorhinolaryngology.

Finally, we thank our supporting institutions, the University of British Columbia, the Vancouver Hospital and Health Sciences Center, and the Jules Stein Eye Institute at the University of California, Los Angeles.

We also thank Kathey Alexander for supporting this project and Kathy Cianci for directing the production and editing of a complex book.

SECTION I

PRINCIPLES OF SURGICAL MANAGEMENT

CHAPTER

1

Introduction

In order to intervene, the surgeon has to develop indications for surgery within a contextual framework that is based on an understanding of the nature of the patient's disease. Specifically, this framework includes knowledge of the location of the disease (within the body in a general sense and within the orbit specifically) and of the anticipated effect of the process on structures within the orbit. If disease is analyzed within this framework, by the time we intervene, we should have a very good concept of the purpose of the surgery, both with respect to the goals of the operation and with regard to anticipated alterations in the tissues that will be encountered during the procedure. The other element that is integral to successful orbital surgery is a clear three-dimensional engram of the territory into which we are going to proceed so that, as we expose disease, we have an image of normal and anticipated abnormal anatomy. Armed with knowledge of the disease, its effects on normal tissue, and normal and anticipated abnormal anatomy, the surgeon is best prepared to perform meticulous and purposeful surgery that will ultimately lead to diagnosis and appropriate management of disease.

CLINICAL PRESENTATION OF ORBITAL DISEASE

The surgeon has to conceptualize disease within the orbit in a way that provides a broad and easily understandable rationale. A useful framework is a clinically oriented categorization that is sensitive to recognition of the effects of the pathologic process at the time of surgery. The abnormal changes brought about by disease in the orbit can be divided into four categories of clinical manifestation. These categories are not necessarily independent but provide a working framework for the characterization of a particular orbital problem. These include inflammation, mass effect, infiltration, and vascular change.

Inflammation is characterized by, and can be inferred from, signs and symptoms of pain, warmth, loss of function, and mass effect. Mass effect itself leads to displacement of structures with or without signs of involvement of sensory or neuromuscular structures. The direction of displacement may point to the location of disease and, with the surgeon's knowledge of site-specific differential diagnoses, can provide clues to the nature of the process as well. Infiltrative changes are usually associated with evidence of destruction, entrapment, or both, which may lead to effects on ocular movement or neurosensory function, such as diplopia, ptosis, muscle restriction or fibrosis, optic neuropathy, pain, or paresthesia. The major features suggestive of vascular effect consist of venous dilatation; tissue edema; hemorrhage; infarction; and alterations in the character, size, and structural integrity of vascular components. These concepts are covered in greater detail in *Diseases of the Orbit* (Rootman, Lippincott, 1988).

PATHOPHYSIOLOGIC PROFILE OF ORBITAL DISEASE

Just as we have divided the clinical presentations of disease into general categories for purposes of establishing a framework approach to patients with orbital disease, we can also divide specific orbital processes into broad pathophysiologic categories. Although many classifications have been proposed, we find a simple classification into six categories to be useful. The percentages and numbers of cases listed incorporate the total experience of the University of British Columbia Orbit Clinic from 1976 to 1993 (Table 1-1).

These general processes are not necessarily independent and can occur together, either in or around the orbit. Thyroid-related orbitopathy is by far the most common disease seen in an orbital referral practice, and it accounted for almost half of all patients.

Neoplasia groups together a broad spectrum of biologically autonomous growths originating from every possible precursor cell that resides in or passes through the orbit. These tumors range from benign to malignant lesions, and this is reflected clinically in a spectrum of pathophysiologic behaviors from noninfiltrative firm or soft to infiltrative cicatrizing and destructive tumors.

In the category of structural disorder's are both congenital anomalies and acquired lesions. These include bony abnormalities, traumatic deformities, cysts, and ectopias. Cysts and ectopias, in particular, may present with a slow mass effect, requiring differentiation from neoplasia.

Inflammatory processes in the orbit are dominated by infections and inflammations of the various orbital structures occurring singly or, more often, in concert with more than one structure involved. A spectrum from acute to chronic inflammation is observed. Chronic inflammations, because of their slower onset and potentially cicatricial nature, can mimic infiltrative or noninfiltrative neoplastic masses, whereas the acute and subacute processes are dominated by clinical features suggestive of active inflammation.

Vascular lesions include a large number of diseases; the most important clinical features are governed by the degree of hemodynamic connection of the lesion with the vascular system. On the arterial side, active lesions include arteriovenous malformations and fistulas as well as some vascular tumors. Hemodynamically isolated lesions include the lymphangioma. On the venous side, varices can participate actively in the orbital venous circulation and be distensible or be hemodynarnically more isolated and therefore nondistensible.

Degenerations, atrophies, and depositions are rare but include such disorders as facial and orbital atrophy, amyloidosis, myopia, and linear scleroderma.

In all these categories of orbital disease, mass, infiltrative, inflammatory, and vascular clinical effects can combine in various ways to bring to our attention the patient who has an orbital process with proptosis, enophthalmos, or dystopia. This schema provides a global framework for the differential diagnosis of an orbital lesion.

Table *1-1. Pathophysiologic categories of orbital processes*[a]

Thyroid-related orbitopathy	50% (1,485)
Neoplasia	20% (585)
Structural	14% (416)
Inflammatory	9% (274)
Vascular	3% (84)
Functional or normal	3% (79)
Degenerative, atrophy, and deposition	2% (50)
Unknown	0.4% (12)

[a] From the U.B.C. Orbit Clinic.

It cannot be emphasized enough that surgery is more about adequate knowledge of disease processes, diagnostic acumen, and proactive preparation than it is about technical expertise. There is nothing worse than doing an elegant and sophisticated operation for the wrong reasons.

Surgeons must be prepared to be flexible when the unexpected is encountered. At the same time, possessing the skill and knowledge to change surgical course when unanticipated intraoperative findings are discovered is no excuse to rely on this skill inordinately. Our goal must always be to minimize the amount of surgical trauma and maximize the outcome for the patient, and this requires careful planning based on a broad understanding of pathophysiologic processes.

Anticipatory surgery requires that surgeons have a very good idea of where they are going, why they are going there, how they will get there, and what they hope to achieve in going there. The second section of this textbook deals with the "where" and "how" of orbital surgery. In this section, we will discuss indications for orbital surgery (the "what" and "why"). In addition, we will address the critical relationship between clinicopathologic knowledge of orbital disease and orbital surgery. All of the permutations and combinations of the structural and physiologic relationships and the way in which disease alters these—both preoperative clinical clues and intraoperative surgical clues—are important to acquire in the overall conceptual framework of surgery.

SUGGESTED READING

Albert DM, Jakobiec FA, eds. *Principles and Practice of Ophthalmology: Clinical Practice.* Philadelphia: WB Saunders; 1994.

Henderson JW. *Orbital Tumors.* 3rd ed. New York: Raven Press; 1994.

Rootman J. *Diseases of the Orbit: A Multidisciplinary Approach.* Philadelphia: JB Lippincott; 1988.

CHAPTER

2

General Indications for Orbital Surgery

The approach and timing of surgery depends on the nature of the disease, as defined by clinical evaluation and laboratory investigation. The primary indications for intervention in our experience have been for thyroid orbitopathy, biopsy, excision of a cyst or mass, repair and reconstruction, drainage of an abscess, removal of a foreign body, and management of vascular lesions. Because of its importance, decompression for thyroid orbitopathy is described in detail later.

Mass

Mass effect within the orbit can be a reflection of either a benign (cystic or solid) or a malignant lesion. By and large, lesions that are biologically benign behave in a noninfiltrative fashion and induce mass effect. In contrast, malignant lesions tend to be infiltrative and lead to actual or threatened disruption of function. These characteristics allow the division of orbital mass lesions into two broad categories with respect to indications for surgery.

Noninfiltrative

Well-defined, slowly growing, or nonprogressive lesions (regardless of cystic, neoplastic, structural, or other origin) should, in the absence of functional deficit, generally be considered for observation. Factors that might motivate the surgeon toward intervention include large size, critical location, rapid rate of progression, functional deficit, or cosmetic abnormality. Surgery in this instance is for the most part extirpative; the goal is complete excision with minimal trauma to adjacent structures.

Infiltrative

Progressive, poorly defined, or infiltrative mass lesions that cause functional deficit or entrapment of orbital structures generally require an incisional or aspiration biopsy prior to definitive management. The management is then based on the histopathologic characteristics of the lesion. Orbital biopsy is a critical procedure that receives less respect than it deserves; meticulous care and a good intraoperative knowledge of what is normal and what is abnormal and a strong sense of location are necessary to obtain a representative sample. In addition, preoperative consultation with a pathologist may be critical to define the necessary volume of biopsy specimen and the most appropriate means of acquisition and management of the tissue to maximize the value of the pathologic investigation. Biopsy techniques will be discussed in detail in a subsequent section.

In the situation of disruption or threat to function significant enough to mandate surgery, it is almost axiomatic that the surgeon has to be extremely careful to avoid exacerbating the already damaging effects of the underlying disease.

Compression of Orbital Structures

Disorders that cause compression of orbital structures with venous congestion, ischemia, and direct barotrauma to delicate tissues can be divided for surgical purposes into acute pressure elevations and chronic orbital compression.

When acute elevation of intraorbital pressure threatens visual function, as evidenced by elevated intraocular pressure, arterial pulsation, decreased vision, or afferent pupillary defect, urgent management is indicated. The acute processes due to reversible, short-lived phenomena such as hemorrhage can typically be addressed with measures such as wound release in the postoperative setting, lateral canthotomy and cantholysis, needle aspiration of localized hemorrhage, and ancillary medical measures such as mannitol and acetazolamide. The management of acute rise in orbital pressure is discussed in detail in a subsequent section.

In the chronic setting, or in acute processes that fail to respond to more limited measures, surgery is designed to improve the relationship of the orbital soft tissues to their bony and periorbital vault. When possible, this can be accomplished by removal of soft tissue within the orbit, for instance, drainage and removal of a cyst that has suddenly expanded and caused compression in the orbit. When the surgeon is operating on a "tight" orbit, a special orientation is required, directed toward minimizing pressure on sensitive structures and maximizing open atraumatic exposure. Techniques that might enhance this approach include preoperative or intraoperative drainage of cystic structures and intraoperative partial evacuation of benign solid structures when necessary in a tight and compressed surgical space that may threaten ocular function.

When the disparity between orbital soft tissue and the surrounding bony compartment cannot be addressed by removal of soft tissue, decompression is performed by enlarging the bony orbital space and transgressing the periorbita. Compressive thyroid orbitopathy is the most important example of this paradigm. Although many different approaches toward bony removal have been described, and versatility with more than one approach is desirable, bone should be removed from the orbital apex in cases of optic neuropathy in Graves' orbitopathy because this is the region of maximal compression of the optic nerve and other critical structures. Another important maneuver is the opening of the periorbita or orbital soft tissue compartment; if this is not done, the unexpanded periorbital vault may prevent sufficient decompression despite adequate bony removal.

Foreign Body

Many inert foreign bodies can be managed without surgery. Indications for removal include vegetable or reactive materials that might potentially be infectious or toxic, externalized foreign bodies, or foreign bodies that cause functional disturbance because of size or location. Foreign bodies that are infected should be removed. Late infections often manifest insidiously as abscesses or draining fistulas. The management of foreign bodies is discussed in more detail in a later section.

Structural Change

The indications for surgical intervention in cases of structural deformity of the orbit fall into two major categories, traumatic and congenital: indications for acute change, primarily trauma, and those for late or chronic change due to mechanical, surgical, or radiation-induced trauma; disease; or congenital abnormality.

Congenital Deformity

Congenital deformities of the orbit are a common component of the major craniofacial syndromes. Repair of the orbital component is part of a multidisciplinary approach to these complex abnormalities because many of the conditions involve not only bony deformity but also structural abnormalities within soft tissues of the orbit, in particular, the extraocular muscles. The repair of these anomalies requires a multidisciplinary team effort and is a complex subject unto itself. Frequently, the midfacial deformities are associated with extremely shallow orbits and exposure of the globes, requiring advancement and reconstruction of the orbit by craniofacial surgeons.

Acute Trauma

Decision making in acute trauma requires balancing the anticipated deformity that might result if no surgery is performed against the risk of acute surgical intervention. There is always a certain amount of guesswork involved in this type of predictive decision making, and therefore no absolute guidelines can be given in any particular case. Indeed, anyone who has worked on a busy trauma service can remember cases in which excellent clinicians disagreed as to the indications for surgery. Further complicating this decision making is the issue of patient expectations. Patients vary considerably in their own acceptance of physical deformity, and the patient's degree of tolerance for change in appearance must be taken into account when making the decision regarding surgical intervention. Also the risk of acute exacerbation of swelling should be considered.

Computed tomography (CT) has revolutionized orbital fracture management. In many ways, the literature from the era before CT scanning became widely available has become archaic. The ability to study bony changes accurately in three dimensions, to identify expansions in orbital volume, and to observe soft tissue changes directly allows us to refine our management of orbital fractures and soft tissue injury. Many of the "controversies" regarding fracture management that characterized the older literature are irrelevant because we can now make decisions based on the precise bony and soft tissue anatomic pathology combined with the clinical examination.

Computed tomography remains the "gold standard" for imaging of orbital and facial fractures because it is fast, is relatively inexpensive compared with magnetic resonance imaging, and provides excellent bony detail. Plain films have very little role to play and, except in unusual cases, should be bypassed for CT scanning in the axial and, if the patient can safely cooperate, direct coronal planes. If one has the luxury of an additional orbital imaging study, then magnetic resonance imaging scanning can provide superb soft tissue detail of the changes in the orbital fat and extraocular muscles that typically occur in orbital fractures. With regard to entrapment of orbital soft tissues, however, orbital imaging must always go hand in hand with clinical correlation. Major categories of management of orbital fractures and posttraumatic deformities will be discussed more completely in Chapter 5.

Chronic Posttraumatic Deformity

Chronic structural deformities of the orbit are particularly challenging. Not only must we take into account the functional and aesthetic considerations listed previously, but we must also be aware of the way that the orbital soft tissues may have responded to injury (traumatic or surgical), radiation, or disease. Patient age and other associated diseases also affect the decision-making process. It is useless to consider orbital augmentation in a patient who has evidence of fat atrophy and cicatrization. Cases in which adequate respect is not paid to the quality of tissue or its ability to respond to surgical manipulations typically result in disappointment for both surgeon and patient and, occasionally, in complications that leave the patient worse off. Patients should be given a realistic outlook with regard to the potential for reconstructive surgery.

Dynamic Vascular Abnormality

There are three types of dynamic vascular abnormalities that may constitute an indication for orbital and/or neuroradiologic intervention. On the arterial side, congenital arteriovenous malformations can occur in the orbit and may cause pulsating proptosis, sometimes associated with sudden thrombosis or hemorrhage within the lesion, thus requiring intervention. A combined neuroradiologic and orbital surgical approach can achieve a cure, as demonstrated in Cases 8-63 and 9-18.

Acquired arteriovenous fistulae are of two types. The first is a low-flow lesion that occurs spontaneously and may result in either unilateral or bilateral mild proptosis and raised venous pressure, which is brought about by shunting from dural cavernous sinus sources. Intervention may be required in instances of persistently raised intraocular pressure, cranial nerve dysfunction, or persistent severe deformity. Intervention is by means of neuroradiologic methods but may require direct orbital approaches, as described later in Chapter 5. High-flow arteriovenous shunts usually occur posttraumatically and almost always require neuroradiologic or neurosurgical intervention to occlude the fistula.

Venous lesions that are dynamic are varices of two types. Nondistensible varices are characterized by episodes of recurrent hemorrhage and orbital swelling brought about by low-flow, turbulent venous perfusion in the venous anomalies. These may require surgical intervention to resect the lesion, as demonstrated in Case 8-38 (Chapter 8). More focal lesions can also be resected, as shown in Case 8-1 (Chapter 8). High-flow or distensible large varices may require complex and combined neuroradiology and direct surgery, as demonstrated in Figure 5-2 (Chapter 5).

EPIDEMIOLOGY OF SURGICAL INDICATIONS

Individual experiences are obviously divergent, and indications for surgery vary from institution to institution. The reason to consider epidemiology of surgical indications, therefore, is by no means to suggest a dogmatic approach or engineer a recommended surgical case distribution. Rather, a broad conceptual understanding of the distribution of disease indications, both with regard to diagnosis, approach, and disease-specific anatomic sites, is very useful in order to make appropriate decisions. There is only a certain subset of diseases that occur within orbital fat, for instance, compared with the lacrimal gland, and a review of site-specific indications for surgery may help the surgeon to develop an engram of processes to consider when making a decision to operate within a particular orbital space.

University of British Columbia Experience *by Jack Rootman and Wilma Chang*

Age, Sex, and Diagnostic Categories of Patients with Nonthyroid Orbital Disease

Table 2-1 demonstrates the age and sex demographics of patients with orbital disease, for an overall series of 1,500 cases. Table 2-2 divides the cases into the diagnostic categories of nonthyroid orbital disease; the overwhelming majority of patients fall into neoplastic, structural, or inflammatory disease categories.

The thyroid orbitopathy database represents 50% of the University of British Columbia Orbit Clinic practice, constituting 1,485 patients, of which 216 have had a decompression.

Table 2-1. Age-sex demographics of orbital disease patients *1976–1992* (total of *1,500* nonthyroid orbital patients)

Age groupings	Females	Males	Total	% of total
< 1	22	17	39	2.6
1-4	42	38	80	5.3
5-16	73	89	162	10.8
17-64	503	448	951	63.4
65+	133	135	268	17.9
Total (% **of total)**	773 (51.5)	727 (48.5)	1,500	

Table 2-2. Overall distribution of nonthyroid orbital disease: *1976–1992*

Diagnosis	Number	%
Neoplasia	585	39.0
Structural lesions	416	27.7
Inflammatory lesions	274	18.3
Vascular lesions	84	5.6
Functional disease (e.g., papilledema, pain, etc.)	79	5.3
Degenerative disease	50	3.3
Unknown	12	0.8
Total	1,500	

Distribution of Surgical Cases by Diagnostic Category

Table 2-3 demonstrates the percent surgical intervention by diagnostic category and reflects the balance of medical versus surgical disease of the orbit.

Table 2-3. Percent surgical intervention by diagnostic category: *1976–1992*

	No. by diagnosis group	No. of diagnosis group with surgery	% of diagnosis group with surgery
Neoplasia	585	321	54.9
Structural lesions	416	153	36.8
Inflammatory lesions	274	94	34.3
Vascular lesions	84	17	20.2
Functional disease	79	11	13.9
Degenerative disease	50	4	8.0
Unknown	12	1	8.3
Total	1,500	601	