EVALUATION

Orbital abnormalities can be appreciated only by those who are familiar with what is normal, and who are therefore aware of the importance of symmetry, balance and harmony. Not surprisingly we owe our knowledge first to artists, such as Leonardo da Vinci, and to anthropologists who studied the facial proportions and established the following relationships.

ORBITOFACIAL RELATIONSHIP

The rule of thirds
The rule of thirds divides the face in three equal superposed levels — the upper, middle, and lower thirds (3.1). The upper and lower borders of the orbit are found respectively in the lower one-third of the upper level and the upper third of the middle level.

An ideal brow level for a female is well above the supraorbital margin with the lateral part slightly more elevated. For the male it is at or close to the supraorbital rim. The brow itself is somewhat arched and, when the medial and lateral end are connected by a horizontal line, the point of maximal brow elevation is found at a line tangential to and vertical to the lateral limbus (3.2). The lateral brow ends on an oblique line passing from the ala of the nose and touching the lateral canthus (see 3.2). The lateral canthus is 1–2 mm higher than the medial canthus in occidentals and often higher than that in Asians. It is 5 mm from the orbital margin and 1 cm from the frontozygomatic suture. Its angle is acute and in contact with the globe. The medial canthus is rounded and separated by the lacus lacrimalis.

The upper eyelid covers the iris by 2–3 mm, and the lower eyelid is at a tangent to the iris. The upper lid crease is 8–12 mm from the eyelid rim. With the eye open, the loose septal skin overhangs the eyelid crease, forming the upper eyelid fold. The distinctive appearance of the Asian eyelid results from a smaller and lower upper lid crease than in occidentals and a very full and prominent upper lid fold that very often hangs over and obliterates the upper lid crease.

3.1 The frontal view of the face in aesthetic proportion. The face is roughly divided into thirds by division made at the points shown (the rule of thirds).

3.2 The female brow in relation to the nose and eye. The female brow lies well above the orbital rim.
The rule of fifths
The rule of fifths breaks down the full face sagittally into five equal parts between the two helices. Each of the five segments should be the equivalent of one eye's width (3.3). A study of this rule shows that the oral commissure is found at a line tangential to and vertical to the medial limbus (see 3.3).

The golden rule
The dimensions, configuration, and position of the interorbital and orbital skeleton are intimately related, and alterations in size, shape, and site of one of these structures may therefore affect this relationship (3.4) (Ricketts, 1982; Pacioli, 1509). Quite naturally, human vision is offended by any abnormality in this particular relationship, but precise measurement has always been difficult.

CANTHI
Abnormalities may be due either to a change in the distances between the canthi or to a change in their level.

Intercanthal distances
An abnormally wide distance between the medial canthi may be observed, and telecanthus must be differentiated from teleorbitism and hypertelorism. Telecanthus is produced by an abnormal insertion or length of the medial canthal tendons, whereas teleorbitism signifies that the distance between the dacryst has increased for some reason. Measurements of the intercanthal distance do not always reflect the position of the orbit and the globe in patients with telecanthus. Günther (1993b) examined the normal distance between the dacryst and found an upper limit of 30 mm. This figure corresponds to a canthal index of 38 when the distance between the inner canthi is compared with the distance between the outer canthi and the result is expressed as a percentage.

Romanus (1953) advocated the use of an outer orbital (eyespan) to intercanthal (eyespace) index to measure the relationship. Dividing the external biorbital diameter measured between the most lateral points on the temporal margin of the orbital wall (OOD) by the diameter joining the inner canthi (ICD), he arrived at a normal value of 40.
Tessier stressed the point that objective measurements of the interorbital distance (IOD) should be taken between the lacrimal crests (the 'dacryons'), recognizing that the value thus obtained may be 7–8 mm greater than that of the more posterior measurements obtained by Günther (1933b).

Average values for the distance between the dacryons, the canthi and the lateral orbital wall are presented in 3.5.

The term teleorbitism or hypertelorism is used when there is an interorbital distance of more than 30 mm and a canthal index over 42.

Along with Günther, Tessier (1972) distinguishes between degrees of hypertelorism:

• 1st degree hypertelorism – 30–34 IOD.
• 2nd degree hypertelorism – 34–40 IOD.
• 3rd degree hypertelorism – over 40 IOD.

Classifying hypertelorism with its different aetiologies and varied appearances is not as simple as one might believe, but accurate differentiation is important if the type of malformation and its correction are to be matched. It should be based on the consideration that hypertelorism does not represent a syndrome but is rather only one of the signs that may be observed in this area. An abnormally wide interorbital distance is not automatically associated with divergence of the orbital axes and the lateral orbital walls.

It is therefore suggested that distinction is made between orbital hypertelorism (teleorbitism), in which there is true lateralization of the orbits, and interorbital hypertelorism, in which there is no observable lateralization of the orbits.

Interorbital hypertelorism is present when the IOD is increased and the distance between the ectocanthia is normal. This anomaly is observed in patients with encephalocoeles or pneumatoceles. Orbital hypertelorism (teleorbitism) exists when both distances are increased.

Canthal level (3.6)
Cranial displacement of the lateral canthi (mongoloid slanting) is seen in Down's syndrome. Caudal displacement of the lateral canthi (anti-mongoloid slanting) is symptomatic of malar dysplasia. Widening may be seen in rare malformations such as Goldenhar's syndrome.

Alterations in the position of the medial canthi following trauma may occur in every direction – posterior and anterior, cranial and caudal, medial and lateral. Medial displacement of the lateral canthus may have been caused by trauma but more often it is iatrogenic, following eyelid reconstruction. Lateral displacement of the medial canthus may be due to rare skeletal diseases such as fibrous dysplasia or craniofacial dysplasia. More commonly, however, it is caused by cysts and tumours of different origin.

**Eye exposure**

The amount of exophthalmus or enophthalmus is determined by the relation between the volume of the orbital contents and the volume or shape of the orbit itself (3.7).
Exophthalmus due to alteration of orbital shape or reduction in orbital volume is seen in various synostosis syndromes, such as Apert's syndrome and Crouzon's syndrome. When it is due to an increase in volume of the orbital contents, it may be caused by buphthalmia, orbital cysts and tumors, and retrobulbar haematoma. Most frequently it is related to thyrotoxicosis. Enophthalmus may be observed in patients with microphthalmia or Treacher–Collins syndrome, after fractures of the orbital walls, or as a result of fat atrophy.

Exophthalmus and enophthalmus can be measured with an exophthalmometer, but more accurate information is provided by CT scanning. Exophthalmus should be distinguished from inferior exophthalmus and enophthalmus due to retrusion of the orbital floor, lid retraction, or lagophthalmus.

**Eyelids**

Texture and structure of eyelids can be described in a variety of ways. The tissues may be called slack, soft, thin, smooth, loose and redundant or tight, firm, thick, scarred, adherent, or deficient.

**Deficiency of tissue**

Diffuse deficiencies of tissues of skin conjunctiva are seen in blepharophimosis, certain diseases (psoriasis, ichthyosis, pemphigus, trachoma), and burns. As a result, symblepharon, entropion, or ectropion can occur in these patients.

Circumscribed deficiencies are seen in congenital anomalies such as ectropion, euryblepharon, epicanthus, and colobomata, and in traumatic lesions.

Traumatic lesions in particular require a detailed analysis involving several questions concerning location and penetration of the wound or the configuration and direction of scars. For example:
- Does the lesion involve the lacrimal apparatus or levator muscle?
- Is the lesion linear or more complex?
- Does the scar run parallel to the palpebral fold or tension lines?
- Is the lesion associated with a deficiency of tissue causing either entropion or ectropion?

**Redundancy of tissue**

Redundancy of skin or conjunctiva is observed in a variety of tumours, including haemangiomas, lymphangiomas, and neurofibromatosis. Much more common, however, is redundancy caused by degeneration. Blepharochalasis, ptosis, entropion and ectropion are some of the abnormalities caused by old age.

**Eyelid fissure**

An abnormal dimension may be symptomatic for a series of conditions (3.8):
- A short fissure may be due to myocutaneous contraction to global retrusion or to canthal and skeletal anomalies.
- A long fissure may be observed in myocutaneous laxity, in global protrusion, and in skeletal anomalies.
- A narrow fissure may be seen in myocutaneous hypertrophy or contraction, in neuromuscular anomalies, in global retrusion, and in skeletal anomalies.
- A wide fissure may be a sign of myocutaneous deficiencies of neuromuscular anomalies and global protrusion.

Many combinations are possible. A short or long fissure may also be narrow or wide. Both eyelids or canthi may be involved or only one. Each combination can be associated with mongoloid or antimongoloid slanting.

**Eyelid function**

Ptosis of the eyelid is usually congenital. More rarely it is caused by lesions of the oculomotor nerve to the levator muscle or by degeneration of the levator aponeurosis.

Lagophthalmus may be produced by hypoplasia of the orbicular muscle, as seen in euryblepharon, or by facial paralysis. Entropion and ectropion are caused by structural differences between the inner and outer lamina, caused by deficiency or redundancy of tissues.

**Surgical Principles**

**Protection from exposure**

**Protecting the cornea**

Hidden between the walls of the orbit and covered by the eyelids, the eye is normally well protected. However, the cornea, being the interface between the brain and the outside world, is extremely vulnerable. It is easily damaged by desiccation and irritation, and trauma, in whatever form, should therefore at all costs be prevented.

Protection of the cornea is urgent in two groups of patients:
- The group with exophthalmus, caused by Crouzon's syndrome, Apert's syndrome, etc.
- The group with lagophthalmus, caused mainly by colobomata or trauma.

In these cases there is a constant threat to the eye, and this becomes particularly dangerous when exposure of the cornea persists during sleep, in spite of a normal upward rotation.
Protecting the conjunctiva
The conjunctiva, although less vulnerable, may also suffer from exposure, but the consequences are never so dramatic as with the cornea and healing is usually complete. Protection of the conjunctiva is frequently indicated in patients with entropion and ectropion, in which chronic irritation may be a source of complaint.

Methods of protection
Correction of the anomaly is of course the best way to protect the eye. However, there may be circumstances that necessitate temporary measures being taken. Such temporary measures include:
- Partial tarsorraphy.
- An hourglass bandage, maintaining a humid climate over the eye surface.
- Various ocular unguents and liquids.

PREPARATION
When preparing the patient for an elective procedure, a clean operative field can be best obtained with a betadine solution, which does not irritate the conjunctiva. However, for emergency treatment following trauma a different approach is indicated. The orbital area and its surroundings are washed gently with copious amounts of a saline solution. All foreign material is then removed, if necessary with a small brush, and the depth of the wound is explored, taking care not to dissect or undermine excessively. All devitalized tissue and small areas of tissue irregularities are then resected.

This must be done very carefully, because small fragments of skin and conjunctiva may remain viable and their resection may cause a secondary deformity. Meticulous haemostasis is performed either by prolonged compression of bleeding spots or by careful use of the thermocautery.

PROCEDURE
Following inspection and analysis of the abnormalities that can be seen, a strategy for correction should be outlined. This strategy has only one goal – the realization of a perfect result or, in other words, a function and appearance that are as normal as possible. To achieve this goal, a balance must be struck between the demands that are made by the receptor area and the solution offered by the donor areas.

Receptor areas
A correct inventory and analysis of the abnormalities that are present is of utmost importance. Without this, the choice of the best procedure becomes a gamble. This means that an inventory must be made of the existing abnormalities analyzed before considering what to do next.

Donor areas
Following this analysis and inventory, a survey is made of the quality and quantity of the tissues that are available for correction. In general, preference should go to tissues that match the normal colour and texture of the receptor area as much as possible. In this respect there is no better substitute than tissues from the eyelid itself.

If this is not an option, other donor areas will have to be considered. There are many possibilities. If skin is needed, it can be transported as a flap or as a graft. If mucosa is needed a graft is the best solution.

The donor areas should of course be repaired in such a manner that they are barely noticeable.

Incisions of tissues
Facial incisions should correspond with Langer's lines.

Just as there are many roads that lead to Rome, there are also many ways to be successful in ophthalmic plastic surgery. Each surgeon has to decide for himself or herself which procedure is going to give the best result.

This chapter will not provide any easy answers to difficult questions. It has only one purpose and that is to create a solid foundation of principles from which the surgeon can choose according to his or her needs and the needs of the patient. 'The principle is the point and the variation a necessity.'

The correction of a deformity usually involves three steps:
1. The incision of tissues.
2. The fixation of tissues.
3. The redistribution of tissues by various means, such as apposition, transposition, or transplantation.

Incision of tissues
All scars contract but some do so more than others. The degree of contraction is difficult to predict. Some of the factors involved are of an individual nature; they are not known and are therefore difficult to control. One factor, however, is known and always ready for inspection – the direction of the scar.

The direction of the scar affects healing in such a way that severe contraction is produced whenever it runs at right angles to the course of the relaxed skin tension lines, which in the eyelids correspond with that of the orbicularis muscles. Contraction becomes more evident when the scar is long and when the deeper layers are involved. It is particularly pronounced when it cuts across the eyelid rim.

The implications of this are clear. Incisions should follow the course of the orbicularis muscles and be made as near parallel as possible to the direction of the palpebral fissure (3.9).

Although it is true that scars soften and contractures frequently become less severe with time, why rely on nature when it shows time and time again that it can be very capricious?
Fixation of tissues
Healing in the orbital area is excellent and the most important advice is that sutures should never interfere with healing. A strangulating suture does more harm than one that is omitted, as does every suture that irritates the sclera or cornea.
A few inverted 6.0 catgut sutures for fixation of conjunctiva, a mucous membrane graft or subcutis and a few interrupted 6.0 monofilament sutures or a running suture for the skin are usually all that is needed. Even a steristrip may be sufficient.

REDISTRIBUTION OF TISSUES

Approximation of tissue
The term ‘apposition’ is used to indicate a situation in which the edges of a wound can be apposed without further release or mobilization of tissues: i.e. the creation of a flap.
Apposition is the simplest form of closure, and it is performed when there is no or little loss of tissue. It is the procedure of choice in wounds that run parallel to the eyelid rim because it leaves a minimum of scarring and is least time consuming.
It may also be indicated in wounds that run at right angles to the eyelid rim but only as an emergency and only with the thought in mind that secondary correction of scar contraction may have to follow at a later date.
It is not indicated when reposiion will hold the wound edges under unpermissible tension, because tension of the wound edges and attendant disturbances of these edges will cause dehiscence, extra loss of tissue, and secondary deformities due to traction and contraction.

Transposition of tissue
Transposition of tissue occurs when a partially detached piece of skin is moved from one donor position to another receptor position. Transposition is direct when donor and receptor site are in continuity with each other and correction is obtained in one session. Transposition is indirect when donor and receptor site are separated and correction is obtained in two sessions - a first session, in which the flap is transported and receptor and donor site are connected by the pedicle of the transposed flap, and a second session, in which the integrity of donor and receptor site is restored.
The transposition of flaps taxes the ingenuity of the ophthalmic plastic surgeon because the objective is to obtain an optimal correction of the malformation in a minimum of time, using a minimum of tissue and leaving a minimum of scarring. In order to obtain this goal a thorough knowledge of the different flaps and of their possibilities and limitations is required.

Flaps may be differentiated according to composition, configuration, vascularization, and range of motion.

COMPOSITION OF FLAPS

Depending on the nature of the tissues that are incorporated in a flap, distinction can be made between cutaneous flaps, mucosal flaps, and composite flaps. Composite flaps consist of skin and conjunctiva. The tarsus may be included. Cutaneous flaps are frequently raised in combination with some muscle fibres and are sometimes called myocutaneous flaps.

CONFIGURATION OF FLAPS

In textbooks, flaps are frequently referred to as transposition flaps, rotation flaps, or advancement flaps. However, such a distinction makes no sense. All flaps are transposed, as their use involves a change of position, and all flaps can be rotated or advanced (translated). Indeed, the flap that rotates less than any other flap is called a rotation flap (3.10).

Since there are no such flaps as transposition, rotation, or advancement flaps, it would be much better to characterize the different flaps by their shape, because this is the dominant quality. Flaps may be designed in almost any shape but the design is usually based on a form that may be symbolized by a letter, such as U, C, O, or V. In this chapter these flaps will therefore be called U-flaps, C-flaps, O-flaps (or island flaps) and V-flaps (see 3.10).
The decision to use a particular design for transplantation is made only after careful evaluation of its origin, viability, mobility, and utility.

VASCULARIZATION AND VIABILITY OF FLAPS

The question of whether a flap will survive is not determined by the ratio of its length to its width. The critical factor is the number and type of blood vessels located in its pedicle. Based on this criterion, distinction can be made between:
• Random flaps, which are nourished by an unknown vascular supply (e.g. cutaneous flaps that survive by perfusion through the dermal-subdermal plexus, and myocutaneous flaps supplied by muscularcutaneous arteries that enter from muscle). In the peri-orbital and orbital area the blood supply is excellent and the length of flaps may be several times their width.
• Axial flaps, which are vascularized by a recognizable artery.

MOBILITY OF FLAPS

When used to cover a defect the flap is either translated (moved in a direction perpendicular to its base) or rotated (moved laterally). Certain flaps are used for direct transposition whereas others are specially designed for an indirect transposition procedure.
Translation
Translation or advancement has important disadvantages. The range of translation of a flap depends on the elasticity of the tissues it contains and on the extent to which its base is able to follow the translation. In general, the range of movement is rather limited, and part of the gain that has been obtained may become undone as a result of scar contracture. This is particularly so when the axial direction of the flap was designed at right angles to the eyelid tissue.

Further problems are that the redistribution of skin and the quality of scar formation are less than optimal.

**U-flap**
If a U-flap (3.11) is advanced in the direction of its distal end, closure of the defect will be associated with the formation of two 'dog ears' that flank the base of the flap. Correction of these dog ears requires reduction and therefore loss of skin. In addition, the angular or rounded scars at the tip of the flap will tend to contract and cause a 'trapdoor effect'.

**V-flap**
If a V-flap is advanced in the direction of its base, the V-incision is turned into a Y-incision, which may be closed without loss of skin but at the cost of a complex scar (V-Y-plasty).

If the V-flap is advanced in the direction of its tip and a Y-V-plasty is performed, two lateral folds tend to be produced at both sides of its base (3.12). Reduction of this surplus will be associated with the formation of scars at right angles to its axial direction. A Y-V-plasty may be indicated in the correction of canthal malformations but the deformity has a tendency to recur.
**O-flap**
In comparison with the U-flap and the V-flap, the O-flap has a wider range of motion. No lateral excess of tissue is produced and scar contraction has little effect on its position. To avoid a trapdoor effect the flap must, however, be designed in a more elliptical fashion. In general, we see very little use for translation of skin and mostly rely on the rotation of flaps.

**Rotation of flaps**
The range of motion of a rotated flap is determined by the ratio of its length to its width. The longer the flap and the narrower its base, the wider the range will be. The shorter the flap the more restricted rotation becomes, unless its base is partially narrowed by a backcut, as in a C-flap, or totally cut except for its subcutaneous pedicle, as in the O-flap.

**3.13** U-flap rotation always leaves a substantial defect that may have to be closed with a graft.

**3.14** C-flap rotations: a plain C-flap rotation; b C-flap rotation facilitated by first Z-plasty; c C-flap rotation facilitated by second Z-plasty.

**3.15** O-flap. (Courtesy of B Haeseker.)
The value of a rotation flap lies in its potential to close defects within a wide perimeter, and in this respect there is a great deal of similarity between the basic U, C, O and V types of flaps. Differences become apparent in the way the flap is placed into the receptor site and the way the resulting donor site is closed.

U-flap
A U-flap (3.13) cannot be advocated for the purpose of rotation, since there is always the risk of producing a trapdoor effect and its donor site is less easily closed. The wound has to be turned into a V-shaped defect in order to have a linear scar, and the flap has therefore no merit over the V-flap, unless two U-flaps are raised in continuity with each other, creating a visor flap. By this technique, tissues can be safely transposed directly as well as indirectly to the area where they are needed.

C-flap
The C-flap (3.14) requires the undermining of a large surface in order to close a relatively small receptor site. Its rotation is facilitated by a backcut, creating a donor defect that can be closed by advancement of the edges or by transposition of a V-flap as a Z-plasty. Indications for the C-flap are, however, limited. Owing to its shape, planning is difficult and the direction of the final scar at the receptor site may turn out to be at right angles to the eyelid rim. This problem can be solved by the incorporation of a second Z-plasty, as advocated by the first author. A 'derotation' effect is thus produced.

O-flap
The O-flap (3.15) undoubtedly has the widest range of motion. Raising it requires attention to detail and good knowledge of the vascularization. The flap is best designed in an elliptical fashion if scarring in donor and receptor sites is to be minimized.

V-flap
A V-flap obviously has the best chance of success. It blends well with the receptor site and the donor site is easily closed. While generally transposed directly, the flap may occasionally be used in an indirect transposition procedure.

The composite arterial flap that remains attached to the eyelid rim on one side of its base is an example of such a V-flap. Since it is rotated over 180°, it can close a defect in the other eyelid; its pedicle is severed after sufficient time has elapsed. Its value and versatility are best illustrated by the technique that never ceases to intrigue a plastic surgeon, the Z-plasty.

TECHNIQUES OF Z-plasty

The Z-plasty is one of the best weapons in a battle for perfection. It enables the redistribution of tissue by the transplantation of two symmetrical or asymmetrical flaps and the reorientation of a scar within tension lines by elongation, fragmentation, and rotation. The ease with which a flap can be rotated and tissue can be redistributed is determined by the initial orientation of its base in relation to the lines of tension and the size of its apical angle.

Equal Z-plasty
In its most practical form a Z-plasty is performed by the juxtaposition of two V-shaped flaps with equal limbs and equal apical angles of 60° (3.16). Together these flaps form a rhombus with diagonals that cross at right angles, the long diagonal joining the extremities of the lateral limbs and the short diagonal, which is 73% shorter than the long one, coinciding with the common central limb.

After transposition of two flaps at 60°, this orientation will differ by 30° from its original direction, and a gain in length of the short diagonal or central limb will be obtained at the expense of the long diagonal. The result is a new rhombus identical in form but with a different orientation because of the interchange of the two diagonals.

The Z-plasty with 60° flaps is the only one in which the direction of shortening is at right angles to the direction of the lengthening. In every other Z-plasty the diagonals are askew. The transposition of flaps with an angle size beyond 60° will result in a greater gain in length but the mobility of the flaps will be less. In contrast, transposition of equal flaps with angles of less than 60° will produce progressively less gain.

Unequal Z-plasty
In a design with unequal angles, the behaviour of the numerous angle combinations is dictated by the mobility of one or both flaps (3.17). The narrower the base of a flap and the smaller its apical angle, the greater its mobility. The broader a flap, the more immobile it becomes. When the angle of one flap reaches 90°, shortening and lengthening will totally depend on the mobility of the other flap.
Multiple Z-plasty
A combination of smaller flaps instead of one large Z-plasty offers the advantage that tissue is borrowed more diffusely from the surrounding areas (3.18). However, the degree of shortening and lengthening produced by these techniques is similar.

Bisected Z-plasty
Interchange of flaps with angles of 90° or more is impossible, owing to their lack of mobility. One way to overcome this problem and use flaps with angles up to 120° is to bisect the two flaps into four with equal angles of 60°, which can then be transposed with more ease (3.19).

Opposing Z-plasty
The use of two opposing Z-plasties (3.20) may be indicated in areas where particular attention needs to be paid to the direction of the resulting scars in relation to the lines of tension. The possibility of using one common lateral limb in Z-plasties with unequal angles is an important advantage of this technique.

While the mathematical indices throughout the whole range of variations and combinations are well known, they are of little practical value. The qualities of skin and particularly of scarred skin are not the same as those of paper, and the knowledge that the expected gain in length with a Z-plasty can be found by calculating the difference between the short and the long diagonal is not really helpful.

There are, however, some guidelines for optimal planning.
1. The first and most important is that the direction of the lateral limbs should follow the tension lines as much as possible. If this is done correctly, at least two of the three scars will be in an optimal position in spite of some changes in orientation. The third will run in an acceptable direction.
2. The second guideline is that for the formation of these limbs, use should be made, if possible, of already existing scars.
3. The third guideline is that the flaps should be planned within a certain region to avoid dislocation of landmarks.

When planning is difficult, it is better to raise one flap first and to transpose it in the required direction before deciding on position and direction of the second lateral limb.

INDICATIONS FOR Z-PLASTY

The closure of a defect
In the planning of a Z-plasty for closing a defect, several aspects must be considered.
1. The shape of the defect. A wide variety of defects may be observed, but in the context of resurfacing procedures, the rhomboidal and triangular defects are the most important.
2. The form and size of the flap in relation to the defect which must be obliterated.
3. The degree and direction of the distortion that is produced by the redistribution of tissues and its effect on the position of the adjacent landmarks.
4. The number and length of scars and their orientation in relation to the tension lines.

**Rhomboidal defects**

After resection of a tumour, the defect to be closed will quite frequently be shaped as a rhombus with its long diagonal within the direction of the tension lines. Such a defect can be closed in several ways.

A well-known technique is to design a Z-plasty with its central limb in continuity with the short diagonal of the rhombus and one lateral limb parallel to one of the edges of the defect. The rhomboidal flap so planned will provide accurate closure of the defect, but some distortion in the direction of the tension lines will occur and the orientation of two of the resulting scars will inevitably cross the lines of tension.

Theoretically, malorientation of scars can be prevented by the use of another principle described by Limberg for the correction of a contracture, in which a Z-plasty is bisected with two obtuse angles of 120° (see 3.19), but this procedure has not been recorded as having been applied for the closure of a defect.

A better procedure, because the skin is more evenly distributed, is to close the rhombus with the double Z-rhombic technique (3.21). Perfect obliteration with an acceptable orientation of the scars can then be achieved. Unfortunately it is not possible to use two opposing Z-plasties when the position of the rhomboidal defect is close to the eyelid rim.

In such a situation, tissue can be borrowed from only one site, forcing the surgeon to use the Z-plasty with the incorporated rhombic flap.

**Triangular defects**

Triangular defects or colobomas are among the most common defects in the orbital region. They may be caused by the removal of tissue or by the contracture of a scar. In the presence of a scar contracture, the position of the Z-plasty is more or less directed by that of the contracture, but in the absence of such a scar the same principle as used in the resurfacing of a rhomboidal defect can be applied (3.22), because it is made of two triangular defects.

Of the three alternatives that have been discussed, one in particular is useful - the Z-plasty with its central limb marked as an extension of one of the sides of the triangle. One lateral limb is formed by the other side and the second lateral limb determined by the form of the defect. This alternative has several advantages - the transposed flap fits perfectly into the defect and there is no distortion in the direction of the tension lines. The orientation of the scars remains acceptable.

**The correction of contractures**

Contractures are a frequent phenomenon in the orbital region. They may be caused by the redistribution of tissue, producing relaxation in the direction of the contracture, or by the reorientation of the scar within the tension lines. The original scar is in fact broken up into three smaller scars producing lower contractile force.

A scar that crosses the tension lines at right angles or at an angle or more than 60° can best be improved by flaps angled at 60°, with the postoperative central diagonal placed in an optimal position (parallel to the tension lines), at the same time producing an important gain of length.

If the angle between tension lines and scar is 60° or less, the lateral limb should follow these lines as closely as possible. Depending on the type of scar, the following modifications of a Z-plasty can be applied:

- Multiple Z-plasties achieve a more diffuse redistribution of tissues and are therefore useful in long scars.
- Unequal Z-plasties are indicated when tissue on one side of a scar is contracted while being loose on the other side.
- The shorter side can then be lengthened by an incision almost at right angles to the central limb of the Z-plasty. The resulting defect can be closed with a more acutely angled V-flap from the other long side.
- Bisected Z-plasties may show their value when there is severe contracture. Redistribution of tissue is however extreme, entailing a distinct risk of distortions.
- Opposing Z-plasties are indicated when correction of a semicircular scar, fold, or plication is indicated.

**The relocation of a landmark**

The use of Z-plasties is also effective in the relocation of landmarks. Displacement of the canthi may be corrected by transposition in a cranial, caudal, medial, or lateral direction and similar procedures may be indicated for the treatment of a dystopic eyebrow.
TRANPLANTATION AND TRANPOSITION OF TISSUES

Tissue grafts may be used for two purposes:
• For resurfacing of a cutaneous or mucosal defect.
• For restoration of a skeletal defect.

Skin grafts are best harvested in the upper eyelid or in the retroauricular area (3.23). Full thickness grafts have an excellent colour match and contraction is minimal. Full thickness grafts have been shown to be excellent material for resurfacing of fornices and socket defects. Contraction is minimal.

In general, split thickness grafts should not be used in the orbital area, since discoloration and contraction tend to be severe. However, in major defects caused by burns, thick split thickness grafts may be indicated.

Mucosal grafts are best raised in the buccal area (3.24).

Cartilage grafts provide optimal tissue for the augmentation of volume defects. Resorption is virtually non-existent. The ribs offer the best donor site (3.25).

Bone grafts can be harvested from several areas, the skull and the iliac crest being most commonly used.

Split thickness skull grafts (3.26) are nowadays advocated by many craniofacial surgeons but resorption of bone can be significant and donor site morbidity occurs not infrequently.

Donor areas
Optimal reconstruction of a defect requires replacement of the lost parts with tissues that match these in quality and quantity. Replacement should not be associated with loss of function, distortion of landmarks, or conspicuous scarring in the donor site. This means that tissue should be borrowed only from donor sites with a relative surplus and that priority should always be given to sites with the best quality match. In this respect the eyelid itself cannot be surpassed. But if this donor site is not available, the following tissues should be considered:
• The frontal skin.
• The galea.
• The subgaleal fascia.
• The temporalis fascia.
• The temporalis muscle.
• The retroauricular skin.
3.27 Forehead flaps: a Superficial temporal artery nourishing island flap; b Sickle flap; c Scalping flap; d Median forehead flap.

Frontal skin
The forehead (frontal skin) (3.27) has been used in a number of ways for lid and socket reconstruction. As originally described by Esser and later by McGregor, virtually the whole of the forehead can be elevated based on one superficial temporal artery. However, a flap that includes half of the forehead and that is based on the contralateral superficial temporalis artery is long enough to reach the orbital area. The scalping flap of Converse (3.27c) provides an example of this technique. Alternative procedures are the sickle flap first reported by New and the island flap advocated by Esser.

Major disadvantages of using frontal skin are its thickness and lack of pliability, the possible damage caused to the frontalis branch of the facial nerve, and the fact that it is a conspicuous donor area.

The flap described by Leonard preserves frontalis action and cosmesis as well as making for a thinner more pliable flap. The median forehead flap, based on the supraoribital and supratrochlear artery, can be used for smaller defects, but the amount of skin available, unless pre-expanded, is limited.

The galea
The galea (3.28) is the layer immediately below the cranial dermis, to which it is intimately interconnected with fibrous septa. Strictly, the name ‘galea’ should be reserved for its central part – the aponeurosis between the frontal and occipital muscles. Its lateral part has had several names applied to it, the temporoparietal fascia and the
superficial temporal fascia being the most important. Abdul Hassan has described the anatomy of the fascial layers well. The temporoparietal fascia is supplied by the superficial temporal artery, which runs on its surface.

The flap is large and pliable and can easily be transposed to the orbital region. Its elevation is tedious, requiring great care but donor site morbidity is minimal.

**Technique**

The course of the superficial temporal artery and its main branches is established by palpation and Doppler ultrasound. An incision 12–14 cm long is then made parallel to the course of the vessels, taking care to protect them. The edges of this incision are adequately undermined at a level just below the hair follicles, exposing the fascia.

An axial pattern flap 4–5 cm wide is then demarcated and incised down to the level of the pericranium in the distal part of the flap and down to the level of the temporalis fascia in its proximal part. Extension of the flap beyond the midline is possible.

The flap is mobilized. A tunnel is made between the donor and recipient sites and the flap pulled through. The distal part of the flap is inserted into the orbital defect and the scalp incision is sutured.

In order to preserve the seventh nerve, which travels within and along the undersurface of the temporoparietal fascia, Ellis et al. advocate a superficial and lateral tunnel or a deep and medial tunnel since the nerve runs from a deep tissue plane at the zygomatic arch to a superficial plane at the lateral orbital rim. Dissection in the plane between the temporal fascia and the loose areolar subgaleal fascia affords maximal protection to the frontal branch of the facial nerve.

The nerve is at greatest risk of injury when subperiosteal exposure of the arch is required. In such cases, Stuzin et al. recommended a safer alternative by placing the plane of dissection beneath the superficial layer of the temporal fascia (3.29).

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**The subgaleal fascia**

The loose areolar layer beneath the temporoparietal fascia has been shown to exist as a separate vital structure that can be dissected from the adjacent superficial and deep layers. Like the temporoparietal fascia, the subgaleal fascia receives its blood supply from the main blood vessels that enter the scalp at its periphery and divide proximally (the supratrochlear artery, the suprarobital artery, and the superficial temporal artery).

Because of this, its potential as an independent donor site to be used separately or in combination with adjacent layers (bilateral or trilaminar) has been recognized, though unfortunately there are still drawbacks. The dissection is difficult and in their quest for bulk and safety, most surgeons will choose to harvest a compound fascial flap that includes tissue from both the temporoparietal and the subgaleal fascias.

**The temporalis fascia**

The temporalis fascia (3.30) overlies the temporalis muscle. Superiorly it blends with the pericranium. Inferiorly, at the level of the superior orbital margin, it divides into two layers—a superficial layer attaching to the lateral border of the zygomatic arch and a deep layer attaching to the medial border.

The temporalis fascia is supplied by the middle temporal artery. It is much more readily elevated than the temporoparietal flap. However, it is not so large and rotation is cumbersome. Therefore it is to be used only as a donor site for grafts.

**Technique**

An incision approximately 6–10 cm long is made within and parallel to the hairline, anterior to and above the ear. The wound is deepened and its edges are raised sufficiently widely to expose the temporalis fascia. An outline of the graft is drawn—a piece mea-
suring 6 cm x 3 cm is needed to cover an 18 mm implant. When used as a patch, a surface of 2.5 cm x 1.5 cm is required. The graft is easily dissected and the wound closed in layers.

**Temporals muscle**
The temporals muscle (3.31) is supplied from its deep surface by the deep temporal artery. It is a large muscle that is readily elevated and has sufficient bulk to be brought through the lateral wall of the orbit for volume filling following exenteration. Its arc of rotation makes it unsuitable for eyelid reconstruction.

**Technique**
A hemicoronal incision is made and deepened to expose the temporals muscle lying deep to temporal fascia, the superolateral rim of the orbit, and the zygomatic arch. The temporals fascia is separated from the temporal crest and the lateral rim of the orbit, leaving a margin of pericranium for future attachment.

Both sides of the lateral orbital wall are then exposed and a hole drilled in its lateral aspect to create an opening behind the lateral orbital rim. The periorbita is incised in a direction parallel to the lateral orbital rim.

The temporal muscle flap is then divided into anterior and posterior segments. The anterior segment is pulled through the defect in the lateral orbital wall, into the orbital cavity. Excess tension and compression should be avoided. To prevent hollowness of the temporal donor site, the posterior segment of the temporal muscle is attached to the lateral orbital rim.

**Retroauricular flap**
Washio based his technique on the existence of a watershed between two major blood supplies. The ingenious flap that he described allows the transport of postauricular hairless skin to the facial region. The quality and quantity of skin available is excellent; however, it is a multi-staged technique and it gives the patient a very bizarre appearance after the first stage.

The donor site requires a skin graft. Island flaps have been described by Guyuron (one stage) and van der Meulen (two stage). Unfortunately, the vascularity of these flaps is not sufficiently reliable because the retroauricular portion of the flap has a random vascularity.
**Technique**

**FIRST STAGE**

First, the course of the superficial temporal artery and its posterior branch must be established by palpation and Doppler study. The steps are illustrated in 3.32. Measure the distance from point A directly in front of the tragus to the medial canthus. This is usually approximately 12 cm. Then draw a semicircle over the temporal area with point A as its centre and half the distance between A and the medial canthus (approximately 6 cm) as its radius.

Mark a point B where the semicircle crosses the hairline. The base of the flap is the line AB.

A line is then drawn in the preauricular and supra-auricular folds, starting at point A and extending in a cephalad and slightly posterior direction. The point at which this line crosses the semicircle already marked is designated point C, thereby forming an equilateral triangle with CB as base, and AC and AB as sides. Washio considered these three points, A, B and C, to be the key in designing his flap.

A second semicircle is drawn in the supra-auricular area with point C as its centre and a radius of again 6 cm by placing D equidistant from B and C. A second equilateral triangle is thereby formed, with CB as base and BD and CD as sides.

Turn the second semicircle into a question mark and delineate the borders of the retroauricular portion of the flap. Incise the margins of the flap and raise it by careful dissection between the pericranium and the galea in the supra-auricular area and by elevation of the skin with the underlying fascia in the retroauricular area.

Injury to the superficial temporal artery is avoided by continuous inspection while the flap is being lifted.

The pedicle of the flap is folded twice: first along the line AB, turning its raw surface outward, then along the line BC, resulting in the formation of a tube with D covering A and its direction pointing forward. The extremity of the flap should reach beyond the medial canthus to avoid tension.

**SECOND STAGE**

The pedicle is separated in the hair-free border at the level of the lateral orbital rim, unfolded and returned to its original position. The split skin area that is covered by the flap is resected and the flap is sutured to the edges of the defect.

**Retroauricular island flap (3.33)**

First establish the course of the superficial temporal artery and its posterior branch by means of palpation and Doppler ultrasound. A retroauricular flap with a surface as large as 6 cm x 5 cm is then designed. Cephalad to this design a triangular scalp area is delineated and depithelialized, thereby exposing the galea while preserving the posterior branch of the superficial temporal artery. The base of this triangle, made about 3 cm wide, marks the upper border of the retroauricular flap. The length of the triangle is approximately 6-7 cm.

The retroauricular skin flap and the depithelialized scalp area are raised at the subfascial level and the pretriangular and preauricular skin are carefully incised and elevated over the course of the superficial temporal artery, permitting the dissection of the retroauricular flap to be continued. This dissection should include the nourishing vessels together with a safe margin of fascia approximately 2 cm wide. A cephalad cutback directly above the helix and 2 cm long makes it possible to increase the length of the pedicle.

Injury to the posterior branch of the superior temporal artery should of course be avoided. The flap is delivered to the orbital area through a subcutaneous tunnel.

**Orbital Osteotomies**

Deliberate osseous sections serve a dual purpose. They can be used to provide temporary access to a cavity or they can be performed to correct an abnormal contour. Their effect is then of a permanent nature. The bones are cut with saws (reciprocating or oscillating), osteotomes or chisels. Rigid fixation of the mobilized portions of bone is essential for good consolidation.
Approach
The bicoronal subperiosteal dissection defined as *la route panoramique* by Tessier gives excellent access to the orbital contours. Only the exposure of the inferior orbital margin and of the orbital floor is difficult with this approach, and a direct approach through the lower eyelid is generally combined to achieve a safe and complete dissection of the inferior part of the orbit. Detachment of the lateral and medial canthal ligaments permits a complete exposure.

Access
Craniotomy
The temporary removal of a bony plate exposes the dura mater and provides access to the anterior cranial fossa. The plate may be mobilized as a bone graft or as a flap pedicled on the ipsilateral temporal muscle in order to preserve its blood supply via the pericranium.

Orbitotomy
Temporary removal of a part of the orbital wall is a very old practice. It can be used to provide better access to the posterior part of the orbit in trauma or tumor surgery.

Contour correcting osteotomies
The cranial vault
Orbital malformations are frequently associated with anomalies of the vault. To correct these, cranial segments can be raised, permitting mobilization in every spatial direction. Transposition, rotation, and reversal of the bony parts make it possible to give a deformed portion of the vault a normal curvature.

The orbitofrontonasal band (3.34)
After the craniotomy the osteotomy continues lateral to the frontomalar junction with the formation of a tongue in groove, a spur or a Z-plasty in the frontosphenoidal area. These extensions provide stability and the use of a bone graft can thus be avoided. After traversing the smaller wing of the sphenoid and the orbital roof in its posterior third, the cut curves forward, avoiding the olfactory groove and passing the midline at the level of the foramen caecum. A horizontal frontonasal section extending in the medial orbital walls to join the cut in the orbital roof completes the osteotomy.

Mobilization of the band requires special attention—laterally, in the orbital pillar, the temporal lobe must be protected; medially, the integrity of the nasal lining and the olfactory tracks must be preserved.

The design of the osteotomy permits much freedom. The superior orbital rim may be removed or remodelled. The band may be moved forward or rotated downwards. It may be split in the middle to permit differential movement of each lateral part and it may be bent to correct abnormal contour using multiple cuts.

Total orbital osteotomies (3.35)
Osteotomies of the orbit involve only its anterior ring (the 'movable orbit' or *orbit utile* described by Tessier). Mobilization is performed at two different levels: one anterior osteotomy around the orbital rim and one posterior inside the cavity. Anteriorly the cut is made horizontally in the supraorbital region. It runs parallel to the inferior edge of the craniotomy and extends somewhat laterally. The bar thus preserved later serves as a line of reference and a site of fixation for the transposed orbit. The malar bone is cut vertically or obliquely to a point slightly below the level of the infraorbital foramen. The incision is continued horizontally in the maxillary body towards and into the pyriform aperture below the inferior concha. It is completed by a second vertical cut through the nasal roof and through the frontal sinus.

At a posterior level the movable orbit is mobilized by a circular osteotomy, which starts in the inferior orbital fissure and is carried up into the anterior cranial fossa. At the pericon, the cut is divided into an external cut, which joins with the lateral extension of the suprorbital osteotomy to form a spur, and an internal cut, which runs across the orbital roof and continues downwards in the medial wall.

This part of the osteotomy is completed by a cut that traverses the orbital floor to join the inferior infraorbital fissure.

3.34 Frontonasal band.

3.35 Total orbitotomy.
**Partial osteotomy (3.36)**
The movable orbit can be divided into four segments:
- Mediofrontal segment;
- Laterofrontal segment;
- Maxillary segment;
- Malar segment.

These segments can be moved separately or in combination. The term 'one-quadrant osteotomy' is applied when one of these fragments is mobilized. A U-osteotomy or two-quadrant osteotomy may be used when two adjacent quadrants are moved as one unit.

There are four types of U-osteotomies:
- Cranial or superior;
- Subcranial or inferior;
- Nasal or medial;
- Temporal or lateral.

**Interorbital osteotomy (3.37)**
Movement of the orbits towards the midline requires the removal of a segment of bone in the frontonasal area. This segment is more often triangular than rectangular.

A superior horizontal cut is first made in continuity with the supraorbital osteotomy. Inferiorly and medially directed oblique cuts pass through the frontal sinuses in their upper part, entering the cranial fossa. In their lower part they cut through the nasal bones and the ethmoid sinus.

An inferior horizontal dissection is carried out between the rim of the nasal bones and the triangular cartilages. This serves to separate the mucosa from the nasal roof anterior to the olfactory tracts. The nasal bones are removed, exposing and preserving the mucous domes.

The central bony block can then be mobilized by a transverse cut through the floor of the anterior cranial fossa at the site of the fron-
toethmoidal junction and through the septum. The exenteration of the interorbital region is completed by the resection of the deformed part of the septum and the ethmoid sinus. The integrity of the olfactory nerves is preserved.

**Orbitomaxillary osteotomy (Lefort III)**
A coronal incision is the principal route of access for the orbitomaxillary osteotomy (3.38). Additional routes are provided by bilateral inferior palpebral incisions. The dissections expose the malar bones, the orbits, and the nasal roof. Detachment of the medial canthal tendon may therefore be required.

Access to the pterygomaxillary junction is obtained via vestibular or palatine incisions. The lateral wall of the orbit is divided transversely at the frontomalar suture line. Posteriorly the line of osteotomy is carried downwards into the infraorbital fissure.

Sectioning is then continued in two directions: medially the osteotomy traverses the orbital floor and the medial wall of the orbit behind the lacrimal fossae to reach the frontonasal suture; laterally and downwards, it runs across the posterolateral wall of the maxilla into the pterygoid groove area, where disjunction may be performed in a variety of ways. Position and direction of the cut in the malar area are dictated by the specific requirements of the case.

In the sagittal plane, the perpendicular plate of the ethmoid and the vomer are severed with the osteotome through the transverse cut at the nasofrontal junction. While performing these steps, it is extremely important to keep clear of the cribriform plates. The mobilization manoeuvres are performed with disimpaction forceps.

**Frontofacial osteotomy.**

**3.38 Orbitomaxillary osteotomy: different variants proposed by Tessier.**

The frontofacial monobloc osteotomy
The frontofacial monobloc osteotomy (3.39) was first advocated by Ortiz-Monasterio in 1978. With this procedure it is possible to advance the maxillomalar complex and the orbitonasofrontal band as a single unit.
To avoid communication of the cranial with the nasal cavities and adjacent sinuses and to prevent infection by maintaining the integrity of the anterior cranial fossa and supraorbital bar, the original technique was modified in 1983 by Anderl, who advocated differential advancement of the forehead and maxilla.

The hemifacial monobloc osteotomy (3.40)

This technique, known by the name of medial faciotomy (facial bipartition, or split face), was first described by van der Meulen in 1976 and 1979. A completely midpalatal osteotomy enables the surgeon to advance and rotate one or both facial halves and thus correct orbital hypertelorism at the same time.

MEDIAL CANTHUS

The medial canthus is where the upper and lower eyelid meet each other in one important anatomical structure, the medial canthal tendon. This band is anchored to the anterior crest of the lacrimal fossa covering and protecting the lacrimal sac. The course of this anatomical landmark may vary from one that is strictly lateromedial to one that runs in a more posteroanterior direction over the surface of the nasal bone. The fixation of the eyelids to the bone by this structure is enforced by a second band that is located behind the lacrimal sac, inserting more posteriorly.

The area superior to the medial canthus is characterized by a valley (the superiomedial angle) which separates the adherent skin over the nasal skeleton from the looser skin covering the superior part of the upper eyelid.

The intimate relationship of the structures that make up the medial canthal region is reflected in the variety of deformities that may be observed. In principle, these can affect the maso-orbital skeleton, the medial canthal tendon, the nasal skin, and the lacrimal apparatus.

Reconstruction of the medial canthal area by means of a canthopexy is complicated by several factors. First, there is the difficulty involved in the reinsertion of the medial canthal tendon in its proper position, i.e. deep behind a line connecting the cornneas. Accuracy is most important here and failure to achieve a good result is mainly due to technical problems.

The position of the canthal insertion makes it awkward to Burr a transnasal tract from one side of the nose to the other through these areas, and pressure on the eye may be difficult to avoid with the apparatus that is normally used. Many surgeons therefore perforate the nasal bone and septum with an awl – a somewhat gruesome procedure.

The second complicating factor is the tendency of the canthal insertion to become detached. This phenomenon probably has its origin in the continuous traction of the orbicularis muscle. This traction will have little effect when the canthopexy is performed according to the principles outlined here but faults in technique will inevitably result in telecanthus. The procedure is as follows (3.41).

A hole is bored at the site of insertion of the canthal tendon or more posteriorly with a diameter sufficiently wide to allow the tendon to enter as deeply as possible. The tendon is identified and secured with a monofilament ethylon 3-0 suture, leaving both ends long.

Two holes are drilled on the contralateral side parallel to and just below the bridge of the nose. The direction of the canals should be such that the tip of the burr becomes visible in the hole that was previously made.

Two hollow needles are passed through these canals, which serve as guides for the ends of the sutures. The needles are then withdrawn and the procedure is concluded by tying a firm knot.

The third complicating factor is the problem associated with the reconstruction of the upper canthal sulcus. Separating the skin and periosteum or the periosteum and bone by sharp dissection or avulsion may have important consequences for the integrity of this area.

The following chain of events may be observed.

Once healing is in progress, the lateral traction of the orbicularis muscle will cause remodelling of scar tissue and loss of adherence between the tissues covering the nasal skeleton. The lateral pull of the orbicularis muscle may join forces with the downward pull of gravity, causing even more relaxation of tissues. The production of fibrous tissue may be enhanced by this traction, and occasionally in young children new bone may even be formed between periosteum and skeleton. Inevitably the upper inner canthal valley will disappear, causing important asymmetry.

THE LATERAL CANTHAL AREA

In contrast to the complexity of the medial canthal area, where three different anatomical planes meet each other at varying angles, there is only one such plane in the lateral canthal area. This simplicity is reflected in the severity of the abnormalities in this region, which, like those in the medial canthal region, may affect the skeleton, the canthal tendon, and the skin, but which are usually easier to correct.

Like its medial counterpart, the lateral canthal tendon consists of a deep and a superficial bundle. The deep bundle runs intraorbitally and has its insertion in the periosteum of Whitnall's tubercle immediately behind the orbital rim. The superficial bundle extends more anteriorly and attaches to the periosteum of the frontal process of the malar bone and the temporal aponeurosis.
If the insertion of the lateral canthal tendon is disrupted by dissection of the periorbit or by a canthotomy in eyelid reconstruction, medial dislocation and rounding of the lateral canthus may result. The same deformity may be seen when the lateral canthal area has been reconstructed following its avulsion or resection but no canthopexy has yet been performed. The distortion is either caused or maintained by the traction of the orbicularis muscle and it may be so severe that vision in a lateral direction is prevented. It must therefore be corrected.

The procedure is as follows (3.42). Two small holes are drilled in the lateral wall of the orbit, directly behind the rim at a site opposite Whitnall's tubercle. The lateral canthal tendon is secured with a monofilament ethylon 3-0 suture and both ends are left long. Two hollow needles are passed through the holes that have been made and the ends of the tendon suture are inserted in the tips of these needles. The needles are withdrawn as soon as the ends of the tendon suture become visible at the other end of the needle. The procedure is concluded with a firm knot.
Temporal sagging caused by laxity of the lateral canthal tendon or the eyelid itself is a deformity commonly seen in patients with a loss of muscular tonus. It also occurs as a result of pressure when a prosthesis is worn. Correction of the laxity and restoration of the canthus can be obtained by resection of a small edge from the eyelid rim and a transosseous canthopexy, as described above. However, similar results may be obtained when the eyelid rim is fixed to the periosteum orbital wall with a small tarsal strip. Loss of muscular tonus. It also occurs as a result of pressure when a prosthesis is worn. Correction of the laxity and restoration of the canthus can be obtained by resection of a small edge from the eyelid rim and a transosseous canthopexy, as described above.

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