A Safe and Accurate Method of Assessing the Size of Implants Required in Orbital Floor Reconstruction

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Abstract

Many methods to determine the size of an orbital floor implant depend on trial and error. However, this technique is imprecise and the repeated insertion and removal of the implant leads to soft tissue trauma and swelling. A method of measuring orbital floor dimensions intraoperatively using a waterproof paper ruler is presented in this study. This technique has the advantage of being simple, precise, safe, and expedient.

Keywords

- orbital floor reconstruction
- implant size and shape
- measurement
- ruler

A variety of implants are available for orbital floor reconstruction, ranging from autologous tissues to permanent and resorbable alloplasts.[1–3] No matter which implant is chosen, its proper placement within the orbit is crucial for a good outcome. Accurate assessment of the orbital floor size is thus of utmost importance to accommodate a suitable implant. Methods that involve gross estimation through trial and error are often tedious and have the potential to traumatize soft tissue. We propose an intraoperative method of measuring orbital floor size with a soft paper ruler. This method is simple, accurate, expedient, safe, and reproducible.

Method

The orbital floor is dissected subperiosteally in the usual manner, exposing the defect and its surrounding bony ledge. A waterproof paper ruler, widely available packaged with surgical skin-marking pens is used. This is cut flush at the 0 cm markings for ease of measurement and is gripped with an artery forceps at 3 cm distal end (►**Fig. 1**).

The ruler is first introduced into the orbit to measure the anteroposterior length. The ruler should go beyond the posterior border of the defect but not impinge on the orbital apex. A little pressure is used to bend the ruler to conform to the curvature of the floor, and the distance to the infraorbital rim is measured. This is the length of the implant required (►**Fig. 2**).

The artery forceps is then repositioned horizontally and the process is repeated to measure the transverse widths. This is done anteriorly at the infraorbital rim and posteriorly near the apex. Again, it is crucial that the ruler is bent to conform to the curvature of the floor and medial wall for accurate measurements (►**Fig. 3**). If necessary, the ruler may be trimmed to aid its insertion into the orbit.

With these dimensions, the implant is cut to size. The corners are rounded off appropriately to prevent impingement on the periorbita. The implant is then bent to conform to the contour of the orbital floor. It is gently inserted into the orbit and any final adjustments may be made if necessary (►**Fig. 4**).

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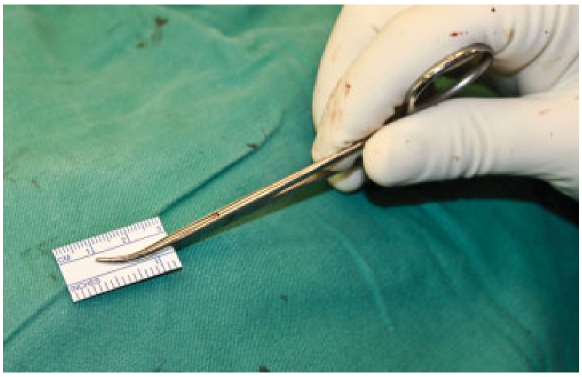

Figure 1 A waterproof paper ruler, widely available packaged with sterile skin markers is cut at the 0 cm marking for ease of measurement, trimmed, and grasped at the distal end with an artery forceps.

Figure 3 The ruler is grasped on its side and to measure the transverse width anteriorly at the infraorbital rim.

Discussion

Accurate placement is a critical factor in achieving a good outcome with orbital floor implants. For this to be possible, the implant must be of a size and shape that is commensurate to the orbital floor. It must be large enough to cover the defect; if it is too small then it would drop into the maxillary antrum and result in dystopia or enophthalmos. It has to sit on at least two bony ledges for stability. Conversely, an implant that is too large or of a wrong shape and contour will not sit flush and may result in dystopia or proptosis. It could also impinge on periorbital structures such as the optic nerve, infraorbital nerve, and extraocular muscles.

Thus accurate assessment of the size of the orbital floor and its defect is of utmost importance. There are several methods for doing so. Preoperatively, the size may be measured through computed tomographic scans. However, assessing it intraoperatively is more definitive. Many surgeons estimate the size of the orbital floor, cut the implant based on that estimate, insert in into orbit to compare, take it out to make adjustments to the size, and shape before the final placement. This can be difficult and time-consuming as estimates are often off due to the three-dimensional nature of the orbital floor. Critical structures such as the globe, optic nerve, extraocular muscles, and the infraorbital nerve may be injured by forcing the entry of a hard ill-fitting plate. Moreover, soft tissue trauma from the repeated insertion and removal of the implant will result in swelling intraoperatively which makes further attempts even more difficult and dangerous. The increased postoperative swelling also causes more discomfort and requires a prolonged recovery. Malleable retractors with markings are an improvement in that they are atraumatic. Usually only anteroposterior dimensions are measured. The transverse widths still need to be estimated.

Our method uses a disposable, sterile, waterproof paper ruler that is widely available packaged with surgical skin markers. This ruler is ideal as it is soft and thin, making its insertion and removal easy and atraumatic. The ruler is easily trimmed with a pair of scissors to aid access into the posterior orbit. The bendable nature of the ruler enables it to conform to the curvature of the floor. This is important in obtaining a measurement that is both precise and accurate. This technique is safe and obviates the need for the repeated insertion and withdrawal of an ill-fitting hard implant that would result in soft tissue injury and swelling. Wastage is also reduced as it is less likely to underestimate the size of implant required.

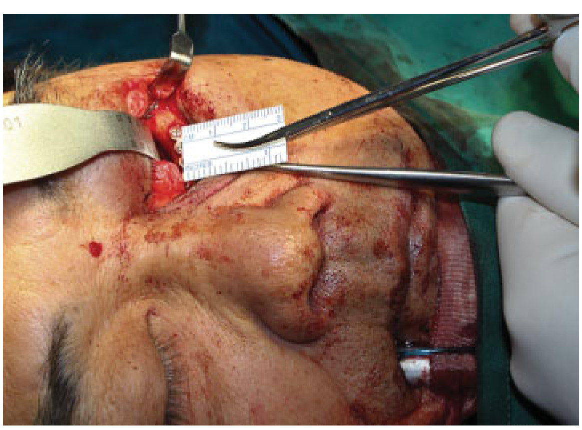

Figure 2 The ruler is introduced into the orbit to measure the anteroposterior length.

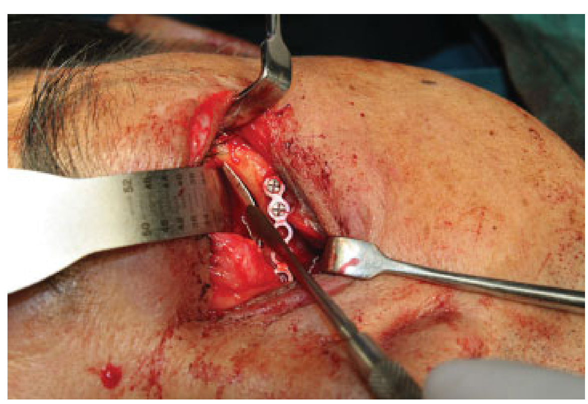

Figure 4 The ruler is inserted deeper into the orbit to measure the transverse width posteriorly. Note that the ruler is bent to conform to the curve of the orbital floor for a more accurate measurement.

Conclusion

We recommend the use of a disposable waterproof paper ruler for measuring the size of the orbital floor is safe. This technique is simple and reproducible and offers the advantage of precision in shaping an orbital floor implant with minimal trauma and swelling.

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