Elliptical Excisions
Variations and the Eccentric Parallelogram

Leonard H. Goldberg, MD, FRCP; Murad Alam, MD

Background: The elliptical (fusiform) excision is a basic tool of cutaneous surgery.

Objective: To assess the design, functionality, ease of construction, and aesthetic outcomes of the ellipse.

Design: A systematic review of elliptical designs and their site-specific benefits and limitations. In particular, we consider the (1) context of prevailing relaxed skin tension lines and tissue laxity; and (2) removal of the smallest possible amount of tissue around the lesion and in the “dog-ears.” Attention is focused on intuitive methods that can be reproducibly planned and executed.

Results: Elliptical variations are easily designed and can be adapted to many situations. The eccentric parallelogram excision is offered as a new technique that minimizes notching and focal tension in the center of an elliptical closure.

Conclusion: The elliptical (fusiform) excision is an efficient, elegant, and versatile technique that will remain a mainstay of the cutaneous surgical armamentarium.

Arch Dermatol. 2004;140:176-180
The tangent-to-circle method is easier for the surgeon because of the facility with which straight lines can be cut. Four simple, quick, well-controlled motions are sufficient for definition of the diamond shape. The evenness of these lines compared with arcs ensures that “dog-ears” on either side of the defect will be even in size and taper uniformly. Less excess normal tissue is removed with straight-line dog-ears.

In some cases, it will not be desirable to have dog-ears of equal size and shape. For instance, there may be a rhytid conferring greater skin laxity on one side of the defect, and in order to place the suture line within the rhytid, a larger dog-ear may be required on that side. This step can be simply accomplished by cutting a larger triangle on one side of the defect (Figure 4). Alternatively, the dog-ears may need to be asymmetrical if the lines of minimal skin tension curve in the vicinity of the excision or if there is an anatomical landmark that must be avoided. Rather than lying along a diameter of the defect and forming a 180° angle, the 2 triangular segments may form a more acute angle. At times, this angle may approach 90° (Figure 5 and Figure 6). Gentle curvature of skin tension lines at the defect suggests modification of the excision so that there are 2 lines along one side of the long axis and a straight line tangent to the circle on the other side (Figure 7 and Figure 8). Suturing of the excision will then naturally pull the tissue along the straight margin into the corner on the contralateral side.

One problem with the rhombic (tangent-to-circle) approach is the notching that may appear at the defect midpoint. (The tangent-to-circle closure seems to have some similarities to the rhombic flap; ie, the closure of a rhombic defect by a rhombic flap may involve a side-to-side closure in the part of the defect that is not closed by the flap.) Where the angles formed by the 2 sets of lines face each other, there is the widest separation between the wound edges, and this separation manifests as a gap. The gap is difficult to close without placing excessive tension on the suture line. One alternative design that can facilitate closure at this point entails shifting the apaxes of the V-shaped indentations so that they do not abut. An eccentric parallelogram, or eccentric tangent-to-circle excision, permits each indentation to be sewn to a linear portion of the contralateral side (Figure 9). A large potential gap is thus divided into 2 gaps of smaller size that are more easily sutured shut. The eccentric excision can be constructed by drawing the smallest square that completely contains a circular defect and has sides parallel and perpendicular to the prevailing lines of relaxed skin tension. Lines can be extended from the corners of each side of the square parallel to skin tension lines. On each side, these lines can meet at a point, and the resulting triangular dog-ears would resemble those in the classic tangent-to-circle method (Figure 10). Once a surgeon has become expert at this modified technique, the eccentric parallelogram can be drawn differently, with the indentations closer to each other than with the square-based approach (Figure 11). Notably, the final suture line from an eccentric parallelogram closure will be S-shaped rather than linear. Relative straightness will characterize the distal arms of the S. Middle arm length will be determined by the distance between the contralateral V-shaped indentations, and the angle between the middle and distal arms by the angle at the V-shaped indentations. Zitelli7 and others have noted potential benefits of the S-plasty, which may minimize scar depression in convex surfaces. A variant of the eccentric parallelogram can also yield a straight final suture line. Specifically, if dog-ears shaped like isosceles triangles are removed from each side of the square encasing the circular defect, a linear closure that still limits central notching and tension can be obtained (Figure 12).

The degree of curvature of suture lines is, of course, contingent on more than the shape of the inci-
Differential sewing techniques can exaggerate or reduce the basic degree of curvature predicated by cutting the repair. By sewing a point on one side, not to the corresponding point on the other side but rather to a point downstream or upstream, the suture line can be curved inward or outward (Figure 13). In expert hands, this technique can be used to create a significant kink in a straight-cut excision. Intuitive understanding of this process, which comes from experience, can facilitate the fine-tuning of a closure; ie, while careful thought should precede cutting of the excision, problems that become evident when suturing is underway...
can be corrected by differential sewing of the sides. Specifically, such shape modification may permit better recession within skin lines or more aesthetically pleasing avoidance of anatomical landmarks.

The tangent-to-circle method and the eccentric parallelogram variant can also be adapted to excisions where a margin of safety is removed around the final defect. First, the size of the margin must be determined. Then, the tangent-to-circle can be drawn starting with this amount of space separating the defect and excision walls at the previous point of tangency between the edges of the circular defect and the cut lines (Figure 14). Similarly, in the eccentric parallelogram, an equivalent distance can be left between the defect and the encasing square (Figure 15). In both cases, once the point of origin of the lines is determined, the rest of the procedure is carried out as described above.

In summary, the elliptical excision remains an adaptable and essential surgical strategy. When adequate tissue is present for a primary closure, a variant of the tangent-to-circle approach will usually be sufficient to orient the suture line within relaxed tension lines and ensure that appropriate-sized dog-ears are removed. The
An eccentric parallelogram can minimize notching at the closure midpoint by distributing central tension over a wider interval.

While these approaches can facilitate construction of elliptical excisions, surgical ellipses are inherently forgiving and tend to culminate in cosmetically acceptable scars even if the operative technique is less than ideal. As trainers of novice surgeons are aware, the inability to maintain a perfect and even rate of curvature, or to adhere to other geometric strategies for lesion removal, does not preclude a good outcome. At the same time, precise planning of excisions based on awareness of specific defect characteristics and local anatomical features can only enhance the likelihood of an optimal result.

Accepted for publication June 25, 2003.

The illustrations for this article were drawn by Maya Goldberg, BS, BA.

Corresponding author: Murad Alam, MD, Dermatology, 675 N Saint Clair, Suite 19-150, Chicago, IL 60611 (e-mail: murad@alam.com).

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