Umbilicosculpture: a concept revisited

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SUMMARY. After birth the umbilicus is the only naturally formed visible scar on the body. To reconstruct a neo-umbilicus following abdominoplasty various local interposition flaps have been described to circumvent a circular scar contracture and to recreate a superior hood. The additional scarring with these techniques can give an operated look to the neo-umbilicus. The importance of gravity in the formation of a superior hood is highlighted and the issue of circular scar contractures is addressed. Emphasis is placed on sculpturing the peri-umbilical fat to enhance contour and on placing the circular scar deep in the neo-umbilicus.

The umbilicus is a tethered scar in the midline of the abdomen, anchoring the abdominal skin to the linea alba via an umbilical stalk. Its appearance changes with age and is influenced by the thickness of the abdominal fat, weight fluctuations, pregnancies, hernias and scars.

In the standing position, the umbilicus has a slight inferior inclination and a small natural looking superior hood. Dick studied the anatomy of the umbilicus and found four fibrous cords attached to its deep surface which exert traction from behind. These cords are remnants of the obliterated umbilical vein, the urachus and the two umbilical arteries. It is stated that the usual inward and upward drag of the umbilical scar results in a characteristic superior hood. Simple observation of the appearance of the umbilicus in different positions, however, reveal that the appearance of the umbilicus and the superior hood is the result of gravity. Figure 1A illustrates a normal umbilicus and superior hood of a healthy adult volunteer in standing position. In supine position (Fig. 1B) the superior hood disappears and the base of the umbilicus becomes visible. When the volunteer stands upside down (Fig. 1C) an inferior hood develops and looks like an inverted replica of the normal umbilicus. Gravity therefore has a major influence on the direction of the drag of the umbilical scar and the appearance of a superior hood.

Different methods to recreate a natural looking umbilicus following abdominoplasty have been devised by various authors using innovative techniques. A circular scar and localised thinning of abdominal fat can contour the centre of the abdominal wall to simulate a natural looking umbilicus. Contractures of the circular scar occur frequently, but how often this causes a problem is not well documented. Baack et al produced an innovative technique to correct established umbilical stenosis as a result of circular scar contractures. Star shaped flaps, V-shaped flaps and circular flaps have been described to break the circular scar and to create the appearance of a superior hood. Various authors have advised minimal fat excision through the neoumbilical incision. The use of local flaps can compromise the overall appearance by

Figure 1—The effect of gravity on the appearance of the umbilicus of a healthy adult volunteer. (For sake of comparison and clarity, the same orientation of the pictures has been maintained with respect to the head and foot end of the volunteer.) (A) Umbilicus in standing position. The umbilicus pulls inward and upward and a superior hood is present. (B) In the supine position the superior hood disappears and one looks straight into the base of the umbilicus. (C) In upside down position the umbilicus is pulled inward and downward and an inferior hood appears.

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producing scars that attract attention and giving the umbilicus an ‘operated look’. Also in such cases, revision of the umbilicus can be difficult when stretching of the scars occurs or when hypertrophic / keloid scars develop. Creating an umbilicus using a circular scar and sculpturing the surrounding fat seems a logical way to reconstruct an anatomical structure that is the result of a circular scar. We have revisited this technique and refer to it as ‘umbilicosculpture’.

**Umbilicosculpture**

The aim of umbilicosculpture is to achieve a natural contour of an umbilicus without scars that can attract attention. There are four important aspects in sculpturing a neo-umbilicus.

*Scar design*

When releasing the umbilicus from the abdominal skin only a small 1 cm disc of the base of the umbilicus is left attached to the umbilical stalk. This can be achieved by placing skin hooks deep in the umbilicus to pull the base upwards. Further trimming can be done after the abdominal flap is raised.

*Stalk shortening*

The umbilical stalk needs to be shortened to create an ‘innie’ umbilicus. Plication of the recti muscles automatically retracts the umbilical stalk sufficiently (Fig. 2A). If plication is not indicated the stalk is shortened by suturing the umbilicus down onto the rectus sheath. Dermal sutures (4–0 nylon) are placed in the periphery of the umbilical disk (Fig. 2B). A temporary stay suture is placed inferiorly in the disk to facilitate final suturing of the neo-umbilicus.

*Positioning of the neo-umbilicus*

Several techniques have been described to determine the exact position of the neo-umbilicus, including the use of specially constructed devices. Whatever technique is used, the abdominal flap must be temporarily sutured and the hips should only be slightly flexed when the position is marked. Of great importance is to excise only a small horizontal ellipse of skin of approximately 1 cm long and 3 mm wide. Due to tension in the midline of the abdominal skin the defect assumes a circular shape.

**Umbilicosculpture**

The temporary sutures of the abdominal flap are released and the flap is everted. Peri-umbilical fat excision using scissors can now be performed under direct vision. The area to be thinned has the shape of a ‘tear drop’ with its apex pointing towards the inferior margin of the flap. The excision of the fat becomes less towards the periphery. It is important that only minimal fat is excised superior to the neo-umbilicus (Fig. 3).

Two vacuum drains are placed and the abdominal flap is closed. The circular defect is sutured down to the edge of the umbilical disk. This is facilitated by feeding the stay suture through the neo-umbilical incision to pull the disk upwards. Multiple interrupted 5–0 nylon sutures are placed close to the margins to prevent visible stitch-marks. Simple paraffin gauze dressing is inserted in the neo-umbilicus which may need to be changed postoperatively to keep the base clean. Stitches are normally removed 2 weeks postoperatively. As scar contraction and maturation occurs, the contour of the peri-umbilical area settles down creating a natural looking umbilicus with a non-conspicuous deeply placed circular scar.

**Discussion**

The concept of liposculpture to enhance contour and minimise visible scars has been applied to most parts of the body using liposuction. Juri et al and Aston proposed minimal fat excision through the neo-umbilical incision and observed that excision of fat inferior to the umbilicus enhances superior hooding. Hakme recognised that abdominoplasty presents a unique

Figure 2—Shortening of the umbilical stalk. (A) Plication of the recti muscles. (B) Suturing of the umbilical disk to the linea alba.
opportunity to liposculpt the umbilicus under direct vision. He, however, excised fat mainly superior to the umbilicus. It is the preponderance of the supra-umbilical fat over the infra-umbilical fat, which in standing position gives the appearance of a superior hood. With time under the influence of gravity this can only improve further.

The reported problems of contracted circular scars in the umbilicus are most likely the result of leaving too much skin attached to the umbilical stalk. The ‘Flask’ and ‘Glass’ principle as illustrated in Figure 4 shows that a problematic cavity can develop deep to the contracture if the umbilical button is too large. Leaving only a small disc of skin attached to the stalk will not only prevent this, but will also pull the abdominal skin closer to the linea alba.

Umbilicosculpture is most effective in the thicker abdomen as there is more fat available for contouring. The supra-umbilical fat layer is heavier and produces a natural looking superior hood in standing position. In addition the circular scar is well hidden in the shadow of the superior hood (Fig. 5).

In the thin abdomen, there may not be enough fat superior to the neo-umbilicus to simulate a superior hood (Fig. 6). But, often there will still be enough difference in the contour for the scar to appear tethered to the linea alba. The scar will be visible, but due to its circular appearance as long as it is placed in the correct position it does not attract attention (Fig. 7).

When there is only very little abdominal fat, local flaps to create a superior hood can be more appropriate. Multigravida and patients who have lost significant

Figure 3—Under direct vision the peri-umbilical fat is excised using scissors. Only minimal fat is excised superior to the neo-umbilicus.

Figure 4—‘Flask’ and ‘Glass’ principle. When too much skin remains on the umbilical stalk, a troublesome cavity can form beneath a circular scar contracture (Flask). A small 1 cm disc of skin remaining on the umbilical stalk prevents cavitation and pulls the circular scar deeper (Glass).
weight often have multiple striae extending into the upper abdomen. The skin in the centre of the abdomen puckers around the umbilicus. In many of these cases the appearance of the neo-umbilicus becomes less relevant due to the already heavily scarred appearance of the abdomen.

Partial or complete necrosis of the skin on the umbilical stalk is a potential complication in all umbilicoplasty techniques. The subsequent scarring, however, will cause the abdominal skin to be pulled inwards and this is what is desired in the first place. Starting off with a circular scar will always make one end up with a circular scar.

Abdominoplasty is a cosmetic procedure with a high patient satisfaction due to the dramatic improvement to the overall contour of the abdomen. Often, an aesthetically poor umbilicus is readily accepted, but absence of the umbilicus is immediately noted and can be very distressing. As part of the finishing touch of an abdominoplasty it is desirable to reconstruct a natural looking umbilicus. The technique of umbilicosculpture can achieve predictable and pleasing results by reproducing the tethered circular scar in the midline of the abdomen. Selective fat excision contours the peri-umbilical area and the rest is up to gravity.

References

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Paper received 18 February 1998. Accepted 20 July 1998; after revision.

Figure 5—Umbilicosculpture in an adipose patient. In standing position a superior hood appears which camouflages the deeply placed circular scar.

Figure 6—An early post operative picture of umbilicosculpture in a thin patient. No significant superior hood appears in standing position but note the absence of a troublesome cavity beneath the circular scar.

Figure 7—Overall appearance of abdomen in the same patient as in Figure 6. The neo-umbilicus is in the correct position and does not attract attention due to its circular appearance.