Background: The groin flap, based on the superficial circumflex iliac artery (SCIA)) was the first-ever successful free flap described by McGregor and Jackson in 1972. Concealment of the donor site scar and a large cutaneous flap meant that this procedure quickly became popular. However, the subsequent development of new flap techniques highlighted major shortcomings of the groin flap, such as arterial anatomical variation, a short pedicle, and the bulkiness of the flap itself.

More recently, the development of perforator flaps (PFs) has enabled the use of thinner flaps, whereas progress in imaging provides more reliable identification of vessels capable of supplying flaps. Thus, the PF based on the SCIA has been described for local or distant coverage of wounds.

The results of these clinical applications suggest that just 1 dominant perforator from the deep branch of the SCIA may be enough to supply a large groin flap. However, the anatomical basis for SCIA groin flaps is less well established than for more popular PFs. The aim of the present study was to determine the size, location, and reliability of perforators arising from the deep branch of the SCIA (Fig 1).
MATERIAL AND METHODS

Ten fresh cadavers (7 men and 3 women) were dissected bilaterally. Cadavers with scars in the groin region or without the deep branch of the SCIA were excluded from the study. The anterosuperior iliac spine, the pubic symphysis, and the crural arcade were used as skin benchmarks (Fig 2).

After the identification of the origin of the SCIA, dissection was initiated medially and then continued laterally to identify the superficial and deep branches of the artery. The deep branch was individualized and its musculocutaneous perforators were identified.

The superficial branch and other perforators were identified and ligated. After identification, the major musculocutaneous perforator of the deep branch was injected with 3 mL of 0.1% methylene blue solution (Fig 3). The location and surface area of the stained skin island were recorded.
Anatomical Background of the Perforator Flap Based on the Deep Branch of the Superficial Circumflex Iliac Artery (SCIP Flap): A Cadaveric Study

Figure 3. Selective injection of the major perforator of the deep branch with methylene blue solution with a 0.65-mm diameter catheter.

The following parameters were measured: diameter of the SCIA, diameter of the deep branch of the SCIA, number of musculocutaneous perforators originating from the deep branch, diameter of the major musculocutaneous perforator and the vena comitans, length of the pedicle (ie, the distance between the origin of the deep branch and the major musculocutaneous perforator), and injected skin area (Fig 4).

Figure 4. Skin area after selective injection of the dominant perforator.

RESULTS

The 10 bilaterally dissected fresh cadavers yielded 20 SCIA dissections (Table 1). The mean ± standard deviation diameter of the SCIA was 1.92 ± 0.6 mm, with a mean diameter of the deep branch of the SCIA 1.35 ± 0.41 mm. We always found at least 2 musculocutaneous perforators through the sartorius muscle (mean number = 2.37 ± 0.51). The mean diameter of the major musculocutaneous perforator was 0.85 ± 0.12 mm. On average, the vena comitans measured 0.73 ± 0.21 mm in diameter. The mean pedicle length was 4.8 ± 1.3 cm, and the mean surface area of the skin island was 162 ± 50 cm² (Fig 5).
Anatomical Background of the Perforator Flap Based on the Deep Branch of the Superficial Circumflex Iliac Artery (SCIA Flap): A Cadaveric Study

Figure 5. The maximum skin area (375 cm²) was obtained after selective injection.

Table 1. Results of dissections

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Mean±SD</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superficial circumflex iliac artery diameter, mm</td>
<td>1.92±0.6</td>
<td>1.2–3</td>
</tr>
<tr>
<td>Deep branch diameter, mm</td>
<td>1.35±0.41</td>
<td>1–2</td>
</tr>
<tr>
<td>Number of Sartorius perforator, n</td>
<td>2.37±0.51</td>
<td>2–3</td>
</tr>
<tr>
<td>Major perforator diameter, mm</td>
<td>0.85±0.12</td>
<td>0.7–1</td>
</tr>
<tr>
<td>Concomitant vein diameter, mm</td>
<td>0.73±0.21</td>
<td>0.6–1</td>
</tr>
<tr>
<td>Pedicle length, cm</td>
<td>4.8±1.3</td>
<td>3–8</td>
</tr>
<tr>
<td>Injected skin area, cm²</td>
<td>162±50</td>
<td>75–375</td>
</tr>
</tbody>
</table>

DISCUSSION

As the first-ever successful free flap to be described (in 1972), the groin flap is of historical importance. However, its use was progressively supplemented by more reliable techniques. One of the main reasons for this drop in popularity is the anatomical variability of the pedicle of the groin flap. Although there are many anatomical variations on the trunk of the SCIA and its superficial branch, Salmon described the existence of a perforator artery arising from the SCIA on the medial border of the sartorius muscle. More recently, the development of PF techniques has reduced the donor site morbidity observed with "conventional" flaps. Hence, Koshima et al reported a large groin flap based on a single, dominant perforator arising from the deep branch of the SCIA. The aim of the present study was to prove the ubiquitous existence of a dominant, musculocutaneous perforator of the deep branch of the SCIA that can be used safely to harvest a reliable PF (Figs 6a, b, and 7) when the deep branch is found. Although many anatomical studies have described perforators in this region, none has described those of the deep branch of the SCIA in detail.

Figure 6. (a) The deep fascia was raised to...
CONCLUSION

The present anatomical study confirmed our clinical suspicions: a single, dominant perforator arising from the deep branch of the SCIA is capable of supplying a large groin flap. Our results suggest that this type of flap could be useful for the reconstruction of the legs with a thin flap and a well-hidden donor site. The SCIA deep branch perforators can provide a constant, reliable blood supply to a relatively large groin flap.

REFERENCES

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