DIEP (deep inferior epigastric perforator) CTA anterior abdominal wall

Purpose

Help surgeon plan and find musculo-cutaneous perforators arising from the DIEA to use as fatty reconstruction flaps for breast

Anatomy

Deep inferior epigastric arteries have perforators that come off, travel through rectus muscle to reach SQ fat and skin. Surgeons choose which to use based on size, morphology and course. Branching patterns of DIEP:

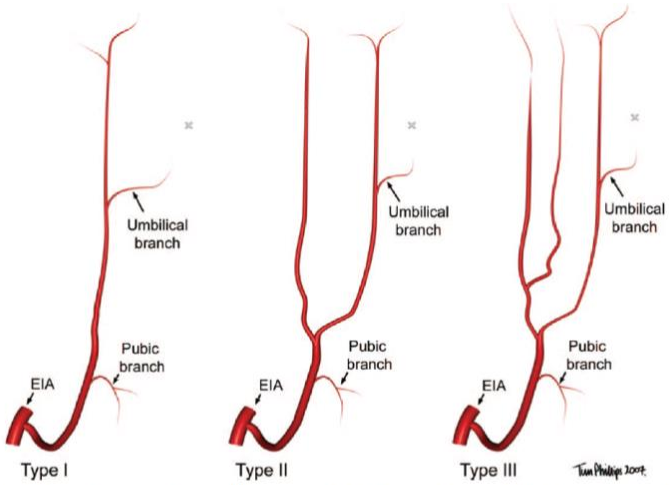

Figure 1: Three-dimensional graphic illustrations show the classification of DIEA branching described by Moon and Taylor (15). Type I (single trunk) and type II (bifurcation into two trunks) branching are more common than type III branching (division into more than two trunks). The umbilical and descending pubic branches are seen regularly. The level of the umbilicus (×) is indicated on each illustration. *EIA* = external iliac artery.

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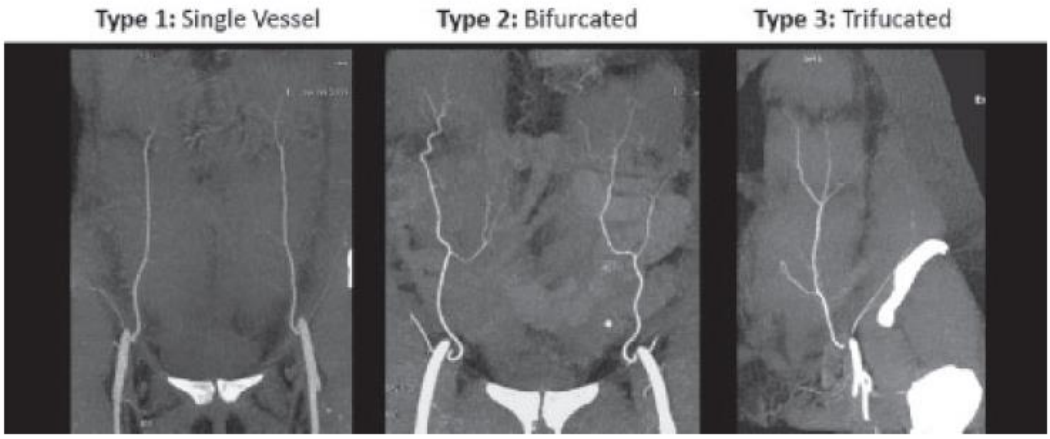

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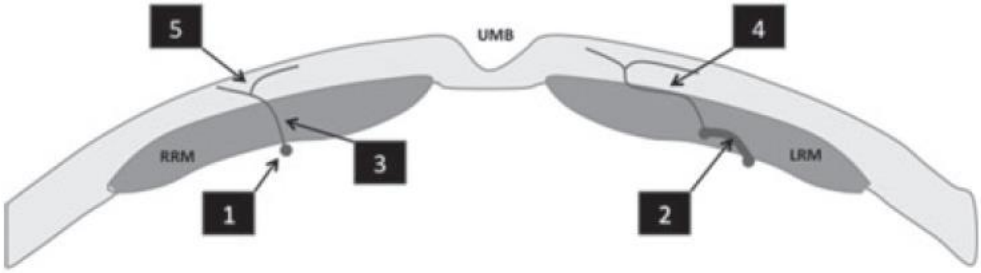
The vascular pedicle may have up to 5 segments which should be described in report:



(b)

(1) DIEA segment deep to the rectus abdominis
(2) DIEA segment within the rectus muscle (intramuscular)
(3) intramuscular segment of a perforating artery
(4) subfascial segment of a perforator
(5) subcutaneous perforator segment.

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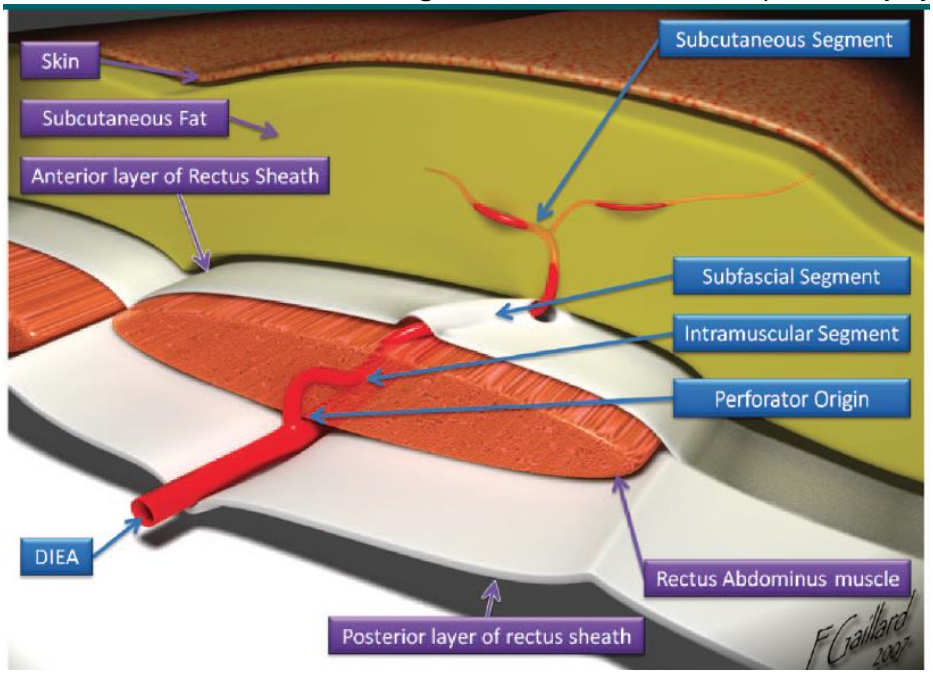
*subfascial and intramuscular segments increase the risk of pedicle injury during dissection



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CTA technique

Protocoling:

Choose the correct button; technique for this exam is different than a standard CTA of the abdomen and pelvis:

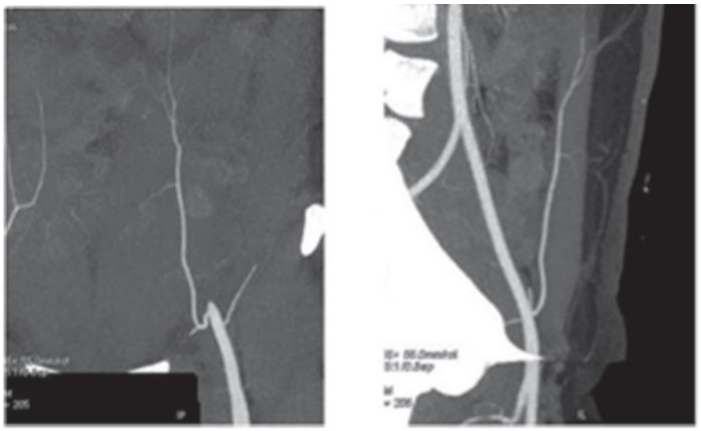
Scan from cranial to caudal
ROI & trigger from common femoral artery

Fixed contrast dose of 150cc

3D Lab Reformatting Technique:

-Thick MIP images to show the origin of each deep inferior epigastric artery from the distal external iliac artery.

-Coronal and sagittal slabs. Labelled R or L. Example:



(a) (b)

Figure 6. A 46-year-old female with breast cancer. Depicting the course and branching pattern of each deep inferior epigastric artery (DIEA). Coronal (a) and sagittal (b) oblique maximum intensity projection (MIP) images are created of a left DIEA to demonstrate the entire course of the vessel in relation to the rectus muscle, and the branching pattern of the artery.

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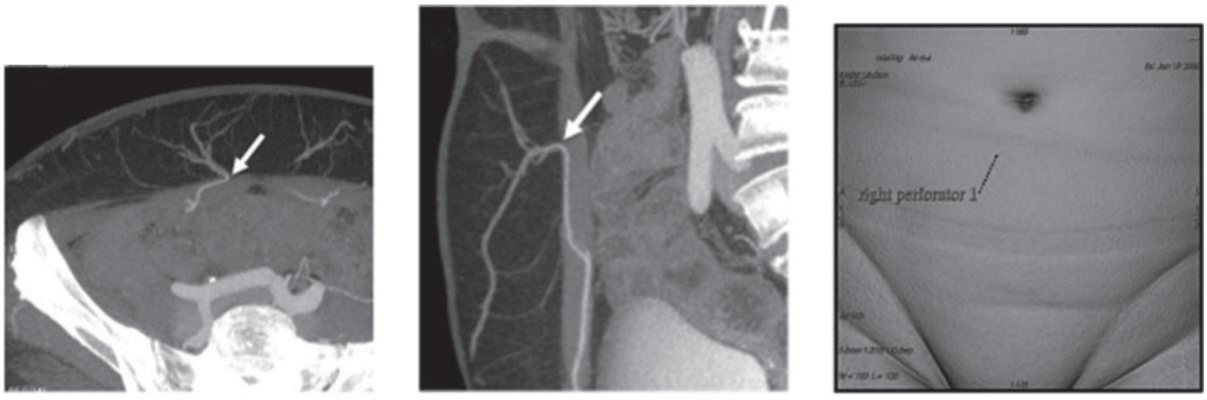
Axial and Sagittal thick slab MIP showing where each large perforator exits the anterior rectus abdominis muscle. Skin view to show the corresponding site on skin so surgeon knows how far from umbilicus. Label as Right #1, Right #2, Left #1, etc. Example:



(a) (b) (c)

Figure 4. A 44-year-old female with breast cancer. Localising the perforator location on the skin view. Site where the perforator exits the anterior rectus fascia (arrows) is identified on the axial (a) and sagittal (b) oblique reformatted images. The three-dimensional cursor is then used to locate and annotate this position on a volume-rendered post-processed image of the skin surface, creating a ''skin view'' (c).

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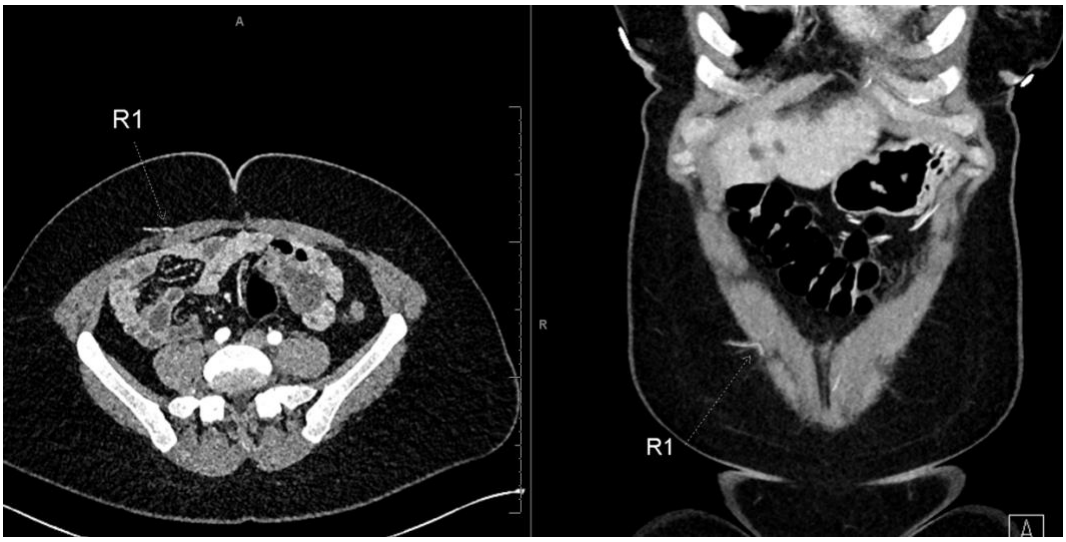
Marking the perforators for the 3D lab

Radiologist reviews images and labels the 2 perforators on each side that the 3D lab will need to reformat and measure distance from umbilicus.

1. Mark the point where the largest perforator exits the rectus muscle on thin axial images with arrow (I mark on both Ax and Cor) Add text to give them a specific name that the 3D lab will also use for their corresponiding images (Right/left perforator 1, 2,3) E.g: R1, R2, L1, L2
2. Notify the 3D Lab you have marked the perforators.
3. Wait for 3D Lab to create the additional reformats and measurements.
4. Check that you agree with their images (QC, below)
5. Dictate the exam using the DIEP flap template which is under Body Templates.



3D reformats and QC-ing the measurements

Since this is a relatively uncommon exam, there is less expertise and experience in creating the reformats. QC'ing the 3D labs measurements is crucial.
This is what the lab will send to PACS for each perforator you mark:

QC How to: Find the marked perforator on the thin axials. Use localizer or scout line mode to find it on Coronals. Scroll through coronals to locate the umbilicus, then approximate its distance to the mark as shown below(where X corresponds to the location of the umbilicus). This should match the ‘skin view’ measurement in PACS.

QC: shows the perforator exits muscle ~ 4.9 cm to right of umbilicus

3D image: Marked site on skin is 5.0cm from umbilicus- correct

Reporting

Choose the CTA DIEP template in powerscribe.

For each side report:
Right anterior abdominal wall:
Deep Inferior Epigastric: [Widely patent].
Branching pattern [type I, II or III] – see screen shot above
Number of large (>1.5mm) perforators: [ ]

Report below for up to 2 perforators on each side.
Location: [medial vs lateral] *(describes where it travels after branching off-medial if going toward umbilicus. Medial is preferred over lateral, as dissecting a lateral perforator may damage nerve innervating the rectus))*
Distance from umbilicus: [ ] mm (use 3D labs measurement for this)
Caliber: (>1.5mm) [ ]
Intramuscular segment [ ] *(pick list-pick < 4cm-short, preferable or > 4cm-long)*
Subfascial segment [ ]. *(pick list)*
Subcutaneous segment [ ]. *(pick list)*