

Non-Contrast Enhanced MRA in the preoperative planning of abdominal perforator surgery for postmastectomy breast reconstruction

J. A. Clavero¹, M. Miyazaki², F. Admira-Behloul³, X. Alomar¹, J. Masia⁴, and G. Pons⁴

¹Diagnostic Imaging, Clinica Creu Blanca, Barcelona, Spain, ²Toshiba Medical Research Institute, Vernon Hills, United States, ³Toshiba Medical Systems Europe, Zoetermeer, Netherlands, ⁴Plastic Surgery, Free University of Barcelona, Barcelona, Spain

INTRODUCTION Post-mastectomy autologous breast reconstruction using abdominal perforator flaps gained popularity because it offers a natural soft breast mound, and preserves the donor site muscle and function. Because the vascular anatomy of the abdominal wall is highly variable between individuals, a detailed accurate preoperative vascular map of the abdomen can significantly reduce the operating time, with a better surgical outcome. MDCTA proved to be very useful for this purpose [1], however it requires ionizing contrast agents and radiation. the purpose of this work was to investigate the role of non-contrast enhanced MR angiography (NC-MRA), as compared to MDCTA, in the preoperative evaluation of the vascular anatomy of the abdominal wall for abdominal perforator flap surgery in post-mastectomy breast reconstruction.

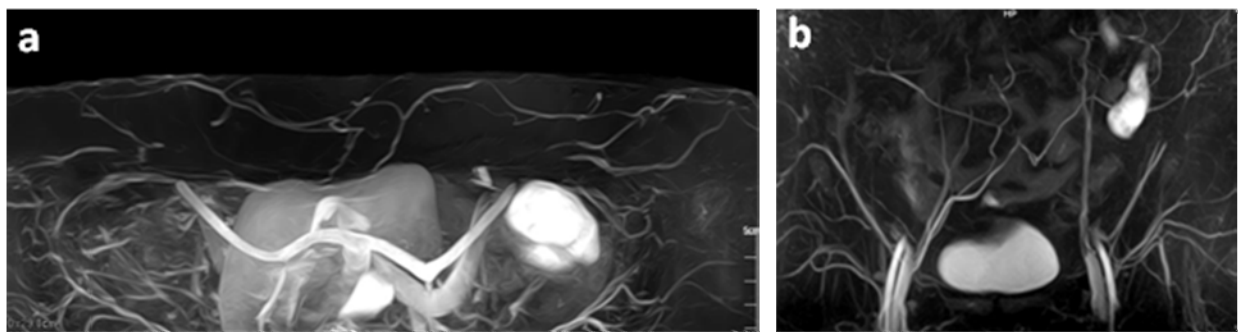


Figure 1: Preoperative FBI images of the abdominal skin allowing excellent visualization of the subcutaneous abdominal vasculature a) axial acquisition b) coronal acquisition.

METHOD AND MATERIALS: 20 patients were included in this study. NC-MRA was performed on a 1.5T MR system (Toshiba Vantage, Tokyo, Japan) using a Fresh Blood Imaging technique based on fast spin-echo, using both respiratory and ECG gating, triggered on expiration and diastole, with the following parameters TE=78, TR=3 R-R, ETS=5ms, nb shots=2, FOV=(48x27, 38x38), Matrix=352x352(axial), 256x256(coronal), slice thickness=6mm (axial), 3mm (coronal), nb slices=25-28, TI=160, parallel imaging factor=2.8. MDCT studies were performed using a 16-MDCT scanner (Aquilion 16, Toshiba Japan). 0.4-second gantry rotation speed, 1-mm slice thickness (x16), 21-mm table travel per rotation, and pitch of 1.4. The x-ray tube voltage was 200–300 mA. All scanning was performed after an IV administration of 100 mL of nonionic iodinated contrast medium at a concentration of 350 mg I/mL. The preoperative evaluation of the images was performed at a workstation. The course of the deep epigastric artery was studied from its origin (external iliac artery) up to the abdominal subcutaneous fat, taking into consideration of its principal trunk and branches. The different perforating artery branches were studied and the precise exit point through the fascia of the rectus abdominis muscle was identified.

RESULTS: Both NC-MRA and MDCT gave good image quality to identify the deep inferior epigastric artery to the precise exit point through the fascia of the rectus abdominis muscle. NC-MRA showed similar image quality and information as MDCT in all patients.

CONCLUSION: NC-MRA can be safely used for an accurate preoperative planning. NC-MRA technique is simple and is able to visualize the origin of the epigastric artery to the exit. Contrast-enhanced MRA has been recently proposed for this application[2]. However, it is not as easy; it requires appropriate contrast media volume, injection rate and acquisition timing, a lot of experience is required for acceptable image quality. NC-MRA is easy, safe and a totally non-invasive examination; it can therefore be used repeatedly for the evaluation of postsurgical changes avoiding unnecessary radiations and contrast media injection.

REFERENCES 1. J. A. Clavero et al. *AJR* 2008; 191:670–676 ; 2. T. Newman et al. *MR-Angio Club* 09.