

CASE REPORT

Breast Necrosis Following Coronary Artery Bypass Grafting

Antonia Bintoudi, MD, Triada Malkotsi, MD, Fotini Goutsaridou, MD, Maria Emmanouilidou, MD, PhD and Ioannis Tsitouridis, MD, PhD

Radiology Department, Breast Unit Papageorgiou General Hospital Thessaloniki, Greece

■ **Abstract:** We present a case of left breast necrosis following coronary artery bypass grafting which was misdiagnosed as a breast cancer. Breast necrosis after myocardial revascularization is an extremely rare complication of the surgical procedure using the most conventional graft which is the left internal mammary artery. The left internal mammary artery is the main blood supplying artery of the left breast. ■

Key Words: breast necrosis, coronary artery bypass grafting (CABG), left internal mammary artery

Cardiovascular disease is one of the most common causes of death among middle-aged women. One to three women will die from cardiovascular disease, after menopause (1). Surgical procedures, such as coronary artery bypass grafting (CABG) or minimally invasive angioplasty techniques, are well established. The internal mammary artery and the autologous saphenous vein are the most common implants for myocardial revascularization. In most of the cases surgeons prefer the left internal mammary artery for myocardial revascularization. The internal mammary artery is the main source of breast vascularization, 60–70% of total blood supply. The breast is also supplied by the external mammary artery and intercostals branches. The major complication after sternotomy for myocardial revascularization are associated with the surgical wound such as infection of the median sternotomy, osteomyelitis, and sternal dehiscence.

Total or partial breast necrosis is an extremely rare complication after sternotomy for cardiac surgery and was not found in retrospective studies.

We present a case of total breast necrosis after myocardial revascularization which was misdiagnosed as breast cancer.

Address correspondence and reprint requests to: Antonia Bintoudi, MD, Department of Radiology, Breast Unit, Papageorgiou General Hospital, Thessaloniki, Ring Road Eukarpia, Greece, or e-mail: antoniabin@yahoo.com.

DOI: 10.1111/j.1524-4741.2010.01016.x

© 2011 Wiley Periodicals, Inc., 1075-122X/11
The Breast Journal, Volume 17 Number 1, 2011 83–86

CASE REPORT

A 76-year-old female patient, who was on regular hemodialysis for chronic renal failure and also suffered from hypertension, obesity and noninsulin-dependent diabetes was admitted to our hospital for clinical examination. Nine weeks ago, the patient, underwent CABG due to a massive occlusion of the left descending coronary artery and the left internal mammary artery was used for the coronary grafting. The postoperative recovery was reported uneventful and the patient was discharged 10 days after operation. Nine weeks after surgery she was presented in the emergency department of our hospital claiming of an extensive skin ulceration of skin of left breast (Fig. 1a,b).

The patient reported that the wound had appeared only few days before. Physical examination revealed no evidence of sternotomy breakdown or any other wound, a mild induration on the left breast and a moderate tenderness around the ulcer. There was no evidence of supraclavicular, axillary lymphadenopathy, or fever. There was a very high suspicion of inflammatory breast cancer so a core biopsy was performed. A large cutting needle (16G) was used. After breast biopsy she was admitted for per os antibiotic therapy. Histological examination revealed extensive fat necrosis, parenchymal calcifications and fibrocystic changes. No evidence of malignancy was indicated.

The patient underwent digital mammography which revealed diffuse, scattered, bilateral calcifications due to fibrocystic changes as well as vessels calcifications due to chronic renal failure (Fig. 2a,b).

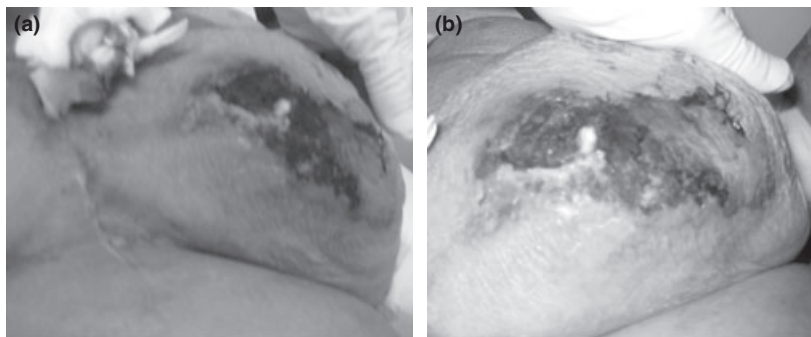


Figure 1. (a,b) Nine weeks after cardiovascular surgery the patient was admitted to our hospital. Clinical examination of the left breast revealed extensive ulceration with erythema, induration and moderate tenderness on palpation but no evidence of sternotomy breakdown.

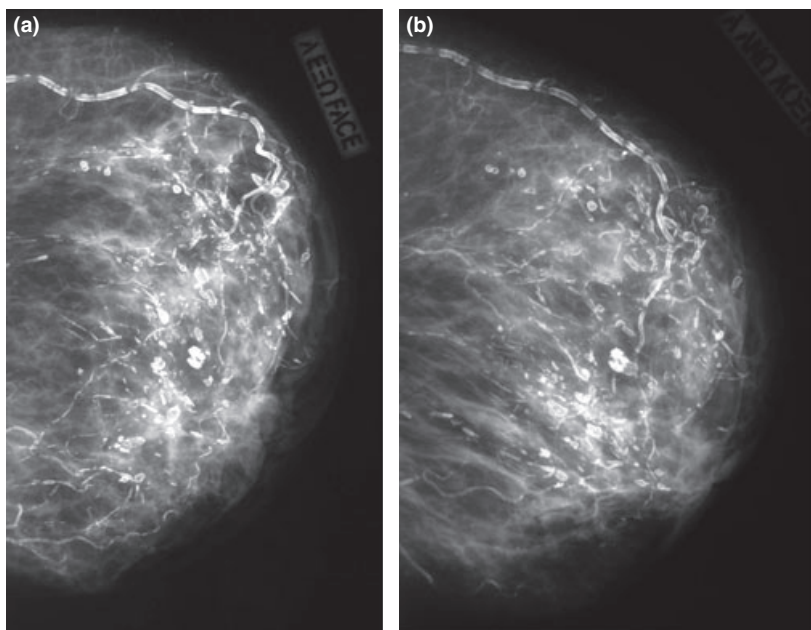


Figure 2. (a,b) Craniocaudal and mediolateral oblique projections of the left breast in which were demonstrated diffuse, scattered, bilateral calcifications due to fibrocystic changes as well as vessels calcifications. A slight, diffuse edema is also present into the breast parenchyma.

Breast edema was present on the left breast. An additional ultrasound examination was performed which showed multiple inflammatory hyperechoic areas, fluid collections and numerous calcifications (Fig. 3a,b).

The patient underwent radical left mastectomy. She completely recovered after a few weeks.

DISCUSSION

Ischemic necrosis of the breast induced after CABG is an extremely rare complication (2). Breast has a rich supplying vascular system due to which ischemic infraction is rare even in the presence of complex cardiac procedures. According to Salmon (3) the breast receives its arterial blood supply from three sources: axillary, internal thoracic or internal mammary source, and the intercostal system. The first two sys-

tems are the major sources while the third one is the minor.

Axillary system derives from axillary artery. By an axillary system Salmon meant that a lateral mammary artery is given off directly from the axillary artery in some subjects, and in others from one of the branches of the axillary artery (3). Lateral mammary artery derives from lateral thoracic artery. It runs over the axillary “tail” of the breast and gives off small non-mammary branches to skin and muscles.

Internal thoracic or internal mammary system derives from subclavian artery. Internal thoracic artery is divided into two branches, anterior and posterior medial mammary arteries.

“Anterior medial mammary” arteries are perforating rami which give off cutaneous and mammary branches, which emerge at the medial ends of first to fourth interspaces one to four. These branches form a

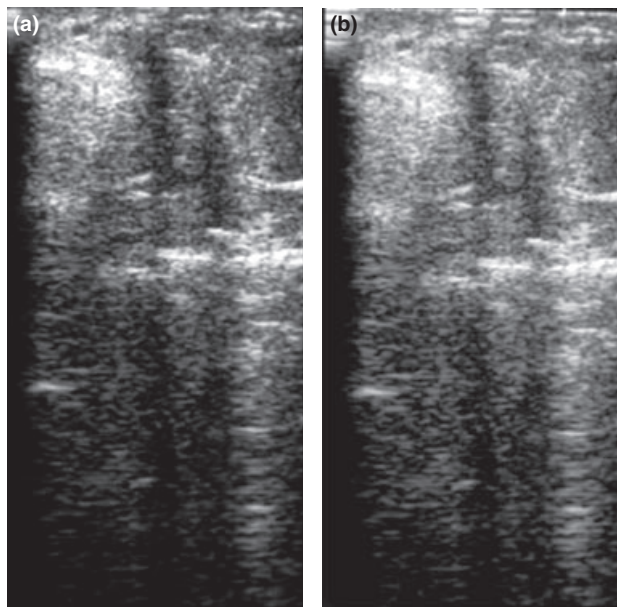


Figure 3. (a,b) Gray scale ultrasonography in which multiple inflammatory hyperechoic areas, fluid collections and numerous calcifications were demonstrated.

plexus with lateral mammary artery which pervades the subcutaneous fat but do not perforate the ligament suspensoria. The plexus supply the glandular parenchyma (3).

“Posterior medial mammary” arteries are typically two branches which traversing the fourth and fifth interspace. These two arteries perforate major muscles. They reach in the retromammary space after a serpentine course and they are forming numerous anastomosis with branches of other arteries on the anterior surface (3).

The minor mammary arteries systems consists of two groups of arteries called the:

1. Pectoral branch of the thoracoacromial artery which runs between pectoralis major and minor muscles giving branches to the posterior surface of the breast.

2. Branches of the intercostal arteries which derive from fourth and fifth posterior intercostal arteries and they follow a serpentine course in the retromammary space before entering the breast.

Normally the breast receives 60–70% of its blood supply from the internal mammary artery (4). There have also been described normal anatomical variants that may result in a breast that is almost exclusively supplied by the internal mammary artery, with minimal contributions from the lateral mammary and intercostal branches.

Despite the rich blood supply of the breast there have been reported situations in which ischemic necrosis was demonstrated, such as infarcts associated with tumors, breast infarction during pregnancy, infarct due to vasculitis (polyarteritis nodosa, systematic lupus erythematosus, and Behcet’s disease) and there are really few reported cases of iatrogenically induced ischemic necrosis after CABG (4,5). There have been documented various situations in which rates of complications are highly increased. Risk factors like obesity, smoking diabetes mellitus, hypertension, and hypercholesterolemia cause large and small vessel disease (2,4). The medium size arteries such as internal mammary artery are also subject to these same pathologic changes. A large breast is also an other factor which may increase rates of complications. Obesity and large breasts have been associated with increased postoperative morbidity but not with complications such as necrosis (1–3,6).

In our case patient presented several risk factors as: chronic renal failure, hypertension, obesity, noninsulin-dependent diabetes, and large breasts. All these factors may contribute to breast ischemic necrosis (7).

The left internal mammary artery is the allograft of choice for revascularization of the left anterior coronary artery. The use of internal mammary artery has been established as the best long term graft with better survival (4,8).

Although the population that requires CABG present most of these risk factors, only few complications are seen.

The patient presented had a very rare complication of internal mammary artery harvest, namely, breast necrosis. Although the patient had lots of risk factors such as obesity, hypertension diabetes, and chronic renal failure which could cause worse calcification of vessels, including internal mammary artery, the most plausible explanation is that this patient’s breast parenchyma was supplied almost exclusively from the internal mammary artery.

Even though internal mammary artery provides approximately the 60–70% of the arterial supply, in some normal anatomic variations breast is almost exclusively irrigated by the internal mammary artery.

In conclusion although ischemic necrosis of the breast, more frequently in the left, is an important complication, it is extremely rare and should not change the surgical planning. Internal mammary artery should remain the choice conduit for coronary bypass surgery.

However, we should be more attentive in patients with diabetes, chronic renal failure, obesity, and of course large breasts. It would be better if before the surgery we perform some critical investigations in which we should add mammography. It would be useful to visualize the degree of vascular calcification to avoid such a complication.

REFERENCES

1. Ricci MD, Ciribela AM, Munhoz AZ, Piatto JRM, Baracat EC. Partial breast necrosis after myocardial revascularization. *Clinics* 2007;62:661–4.
2. Rosato F, Schaner P, Chojnacki K, Rosato EL. Left breast necrosis following cardiac bypass surgery. *Breast J* 2006;12:485–7.
3. Cunningham L. The anatomy of the arteries and veins of the breast. *J Surg Oncol* 1977;9:71–85.
4. Conyon D, Zenn M, Milano C, Levin S. Breast necrosis following use of the internal mammary artery for coronary artery bypass. *Ann Plast Surg* 2005;54:88–91.
5. Rashid A, Haj Basheer M, Khan K. Breast necrosis following harvest of internal mammary artery. *BJPS* 2004;57:366–368.
6. Yoshida K, Ohshima H, Murakami F, Matsuura A, Hibi M, Kawamu M. Two cases of coronary artery bypass grafting following radical mastectomy using internal thoracic arterial grafts. *Nippon Kyobu Geka Gakkai Zasshi* 1997;45:64–66.
7. Janigan DT, Hirsch DJ, Parkhill WS, MacDonald AS. Breast infarction in a patient with chronic renal failure: a case report. *Can J Surg* 1996;39:507–509.
8. Sinhg A, Feng W. Sternal wound infection after myocardial revascularization with internal mammary artery. *Indian Heart J* 1993;45:29–31.