THE RAPTOR: RESUSCITATION WITH ANGIOGRAPHY, PERCUTANEOUS TECHNIQUES AND OPERATIVE REPAIR. TRANSFORMING THE DISCIPLINE OF TRAUMA SURGERY

Exsanguination and death are rapid consequences of untreated hemorrhage. At its simplest, successful treatment requires expedient localization and arrest of bleeding concurrent to adequate resuscitation. Fortunately, the continued improvement of percutaneous therapies now allows them to become more relevant to these treatment goals. The most recent definition of "trauma interventional radiology" is therefore "minimally invasive endovascular techniques used to arrest hemorrhage."[1] This concept reflects an evolution from primarily diagnostic/noninvasive aortic arch angiograms and extremity peripheral vascular angiography, to therapeutic procedures for hemorrhage control.[2] In essence, this approach involves, first, blocking bleeding blood vessels/organs via arterial embolization and/or balloon catheters, and, second, realigning blood vessels via stent grafts. Hemodynamic instability has now become only a relative contraindication with published targets such as the spleen, liver, kidney, pelvis, lungs and all major abdominal vessels (aorta, iliac, renal, lumbar, inferior vena cava).[3] Balloon occlusion of the distal aorta for bleeding pelvic fractures and proximal aorta for cross-clamping is also well established.[4]

It is our opinion that percutaneous trauma procedures can therefore be divided into 2 distinct subgroups:

1. emergent interventions aimed at arresting hemorrhage (e.g., intravascular balloon occlusion with or without arterial embolization), and
2. urgent interventions used to repair damaged vessels (i.e., stent grafting).

Whereas urgent stent grafting should be performed by clinicians with extensive training and experience in both diagnostic and therapeutic angiographic techniques, the emergent arrest of hemorrhage is encompassed within the very definition of "trauma surgeon." Considering that 70% of emergency angiographies occur in "off-hours," with less than 15% performed within 90 minutes of arrival, surgeons trained in emergent percutaneous endovascular techniques who are immediately available at the bedside would be ideal.[5,6] The order in which percutaneous and open procedures are performed can also be dynamic and best suited to a clinician trained to address each concurrently in real time. This demand for cognitive changes in the priorities and urgency of care cannot be understated. As a growing proportion of trauma patients with hemodynamically important vascular injuries are being treated emergently with angiographic techniques, the acquisition of endovascular skills by readily available trauma surgeons seems logical and appropriate.

Given the evolving concept that traumatologists should play a role in the emergent arrest of hemorrhaging trauma patients via balloon occlusion, angiography and potentially angioembolization, visionary surgeons have already begun to embrace these approaches.[2–4,7,8] Although the best route of skill acquisition for the trauma surgeon of the future is still undefined (additional endovascular training within trauma fellowships v. formal vascular training v. supplementary interventional radiology training), some programs (US-based acute care surgery fellowships) have already started to incorporate this paradigm into their training algorithms (1–3 months of angiography training). It is clear, however, that in countries like Canada where percutaneous techniques typically reside within the domain of vascular surgeons and interventional radiologists, we will need to work very closely with our colleagues to define the differences between percutaneous damage control techniques used to arrest ongoing hemorrhage on an emergent basis, versus advanced repairs and stent grafting that should be performed by true content experts on a more delayed and time-friendly basis.

In an ideal scenario, these emergent percutaneous therapies would be performed in the same physical location as open interventions, resuscitation and critical care. This would prevent the dreaded transfer of patients from one venue to another (trauma bay v. operating theatre v. angiography suite v. intensive care unit). To this end, the RAPTOR suite (resuscitation with angiography, percutaneous techniques and operative repair) is becoming available in a small number of centres (Calgary, Canada, and Sydney, Australia). These single suites offer the ability to treat all aspects of a patient's critical injury (i.e., fixed angiography system, operating room, interventional radiology suite and intensive care unit). Furthermore, stakeholders from all aspects of this care (trauma surgeons, interventional radiologists, anesthesiologists and nurses) are involved and will respond on an emergent basis as needed. Given these rapidly evolving operative platforms, as well as the new multifaceted training approaches, the future of trauma surgery appears interesting and bright.

Chad G. Ball, MD, MSc
Andrew W. Kirkpatrick, MD
Department of Surgery
University of Calgary
Foothills Medical Centre
Calgary, Alta.
Scott K. D'Amours, MD CM
Department of Trauma Surgery
Liverpool Hospital
Sydney, Australia

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MAMMAPLASTY FOR SYMMETRY IN BREAST RECONSTRUCTION AND HISTOLOGIC ASSESSMENT

We read with interest the article by Horo and colleagues[1] about the prevalence of borderline lesions and in situ/invasive cancer in specimens of the contralateral breast (CB) in patients with breast cancer. As a multiprofessional breast cancer team, it has been our impression that increasing consideration has been focused on reconstructive techniques, and mammaplasty remains a useful and important procedure. Whereas satisfactory results may be obtained with all reconstructive procedures, in our previous experiences,[2-4] mammaplasty leads to a better overall outcome in patients with breast ptosis/macromastia. Besides these aesthetic benefits, one of the main advantages is the possibility of examining the CB.[5] Thus, this paper is relevant and, again, illustrates the value of these important issues.

Although many of the data described are valuable and interesting, the clinical relevance to be drawn from the results and discussion deserves clarification. As the authors point out, few authors have assessed the incidence of occult lesions in this particular scenario of mammaplasty with a treated cancer of the CB. The authors concluded that no invasive/in situ carcinoma was detected. However, in the limited sample of 77 patients who underwent a mammaplasty of the CB, normal results were observed in 45.5%, benign lesions in 38.9% and borderline lesions in 15.6% of patients. Besides the potential bias regarding the differences in patient populations, the absence of breast cancer detected in this sample can be attributed in part to the limitation of the number of patients included in the study and some bias related to the retrospective design. In our experience, 4.3% of patients who underwent immediate mammaplasty for conservative breast surgery reconstruction received a diagnosis of breast cancer on the contralateral breast (3 patients with ductal carcinoma in situ and 2 with invasive lobular carcinoma).[5] Both cases of lobular carcinoma were diagnosed by intraoperative frozen sections and showed favourable characteristics (small diameter/estrogen receptor positivity). Thus, it has been our impression that the risk in this particular scenario increases in patients with previous breast cancer. In addition, patients with previous breast cancer are at higher risk for new contralateral cancer. Usually, it is expected that the incidence of metachronous breast cancer (MBC) ranges from 1% to 12%.[5] One might surmise that this ample incidence deviation relates to differences in follow-up, methods of detection, histologic techniques and the inclusion of noninvasive tumours. Additionally, a young age at the time of the first breast cancer and a longer survival time may increase the risk for MBC. In our sample, almost 8.5% of patients had an MBC detected during follow-up. Review of the cancer characteristics revealed that most cancers were at an early stage and all were unifocal tumours. Regarding the histologic type, about 65% of patients had invasive ductal carcinoma and almost 30% had a family history of breast cancer. Another relevant point is related to the period between the diagnosis of the first tumour and the MBC. In our study, more than 80% of these tumours appeared within 5 years of the original one. Despite these data, the MBCs in 2 patients were diagnosed more than 7 years after the first breast cancer, which highlights the importance of longer follow-up periods to estimate the real incidence of MBC and the appropriate treatment.

Finally, another important issue is related to the influence of the mammaplasty techniques in the follow-up. In spite of the aesthetic benefits, do the authors have difficulties with surveillance for cancer in breasts that have undergone reduction mammaplasty? This question refers particularly to the distortion of normal architecture and the production of microcalcifications secondary to fat necrosis, hematoma or fibrosis. In our experience, fat necrosis and local tissue distortion were observed in almost of 6% of patients who had CB mammaplasty. Although mammographic discrimination between tumour recurrence/MBC and fat necrosis can be differentiated in major cancer centres, we advocate for a careful surveillance and invasive diagnosis to elucidate this important issue.

Immediate CB mammoplasty in association with oncologic breast surgery is not a new concept but is becoming increasingly accepted by oncologic surgeons. The technique provides an opportunity for diagnosis of breast cancer risk lesions, and postoperative adjuvant chemotherapy is not delayed. It has been our impression that there is evidence of reduction of MBC during follow-up, and we totally agree that a larger number of patients are necessary for significant conclusions. Thus, additional studies of breast