International Journal of Surgery 18 (2015) 34–40

Contents lists available at ScienceDirect

International Journal of Surgery

journal homepage: www.journal-surgery.net

Original research

Angiographic embolization for major trauma in a low-middle income healthcare setting – A retrospective review☆

Adil Aijaz Shah [a], Abdul Rehman [b], Adil Hussain Haider [a], Raza Sayani [d], Raza Hasnain Sayyed [b], Kamran Ali [b], Syed Nabeel Zafar [c], Zia-ur Rehman [b], Hasnain Zafar [b,*]

[a] Center for Surgery and Public Health (CSPH), Brigham and Women's Hospital, Harvard School of Public Health and Harvard Medical School, Boston, MA, USA
[b] Aga Khan University Hospital, Department of Surgery, Karachi, Pakistan
[c] Department of Surgery, Howard University College of Medicine, Washington, DC, USA
[d] Aga Khan University, Department of Radiology, Karachi, Pakistan

HIGHLIGHTS

- Advances in trauma care have made non-operative management of trauma possible and preferable over surgical interventions.
- Angioembolization (AE) is a safe adjunct to surgical intervention in the management of hemodynamically stable trauma patients.
- AE is resource intensive and is largely lacking in developing healthcare systems.
- Success of AE in trauma management in low-middle income settings can parallel models in Western healthcare systems.
- AE for major trauma can be complication free when adequate interventional radiological facilities and expertise are present.
- The availability of equipment and expertise makes the usage of AE for the care of trauma patients in LMIC settings is possible.

ARTICLE INFO

Article history:
Received 22 October 2014
Received in revised form
22 January 2015
Accepted 26 March 2015
Available online 10 April 2015

Keywords:
Embolization
Angiography
Interventional radiology
Trauma
Hemorrhage
Low-middle income country
Pakistan

ABSTRACT

Introduction: Interventional radiology (IR) provides a range of adjunctive techniques to assist with hemorrhage control after trauma that can be employed pre- or post-operatively. The role of IR in lower-middle income countries (LMICs) remains unexplored. This study describes the use of adjunctive angioembolization (AE) in severely injured patients following its recent implementation at an urban trauma center in a LMIC.

Methods: Adult patients (≥16 years) requiring AE from 2011 to 2013 at a single trauma-care facility were included. Data was collected on demographic parameters, transfer status, injury severity score (ISS), emergency resuscitation characteristics, AE and operative characteristics, complications, and in-hospital mortality. Descriptive analyses were performed.

Results: Thirty six patients underwent AE for trauma-related hemorrhagic complications and were included in the study. Average age was 31.5 (±11.3) years with a male preponderance (91.7%). Penetrating trauma (61.1%) was the most common type of injury. The primary mechanism of injury was gunshot (58.3%). The median ISS was 24 (IQR: 20–29). Pre-operative AE was performed in 23 (63.9%) patients and these patients had a lower median ISS (22) than those who underwent post-operative AE ($p = 0.015$). Hepatic (55.6%) and pelvic (33.3%) trauma more commonly required radiological intervention. Bleeding from the right hepatic (n = 14), and the right internal iliac (n = 6) arteries and/or their branches, were more often embolized. Microcoils were the preferred AE agents (61.1%). Median length of hospital stay was 7.5 (IQR: 3–14) days. Eight (22.2%) patients did not survive.

☆ The paper was presented as a quick-shot presentation at the 9th annual meeting of the American Association of Surgery's (AAS) Academic Surgical Congress (ASC) held on Feb 4th, 2014 in San Diego, California.

* Corresponding author. Department of Surgery, Aga Khan University, Stadium Road, P.O Box 3500, Karachi, Pakistan.
E-mail address: hasnain.zafar@aku.edu (H. Zafar).

http://dx.doi.org/10.1016/j.ijsu.2015.03.023
1743-9191/© 2015 IJS Publishing Group Limited. Published by Elsevier Ltd. All rights reserved.

Conclusion: With the availability of multi-detector computed tomography and a dedicated interventional radiology suite, implementation of AE for the care of trauma patients in LMIC settings is possible.
© 2015 IJS Publishing Group Limited. Published by Elsevier Ltd. All rights reserved.

1. Introduction

Trauma continues to be the leading cause of death in people under 40, with 31.6 million people requiring treatment in the emergency department (ED) for trauma related injuries annually [1]. According to a World Health Organization (WHO) report, an estimated 5 million people died of injuries worldwide in the year 2000. Almost 90% of this mortality occurs in young adults of lower-middle income countries (LMIC) [2]. Hemorrhagic shock remains the leading cause of death in trauma patients, second only to injuries of the central nervous system (CNS). It accounts for 30–40% of trauma mortality; however, unlike CNS injuries, active hemorrhage is amenable to interventions that could prove life-saving [3,4].

First described in 1972, angiography and angioembolization (AE) have become indispensable options in the armamentarium for hemorrhage control [5] and are widely employed for control of bleeding from surgically inaccessible sites [6]. Therapeutic AE consists of intentionally introducing particulate matter into the circulation to mechanically occlude bleeding vessels [7,8]. It plays an adjunctive role in managing bleeding from poly-trauma [9,10]. Blunt or penetrating injuries can easily result in life-threating post-traumatic hemorrhage from major vascular structures such as the pelvis, liver and kidneys, contributing to poor early outcomes. In such cases, an angiographic exploratory study becomes necessary for hemorrhage control in the radiology suite and also, to plan for potential imminent surgical interventions [11].

As non-operative management (NOM) of blunt abdominal trauma progressively takes precedence over surgical interventions, the role of AE has become all the more important [12]. This expeditious and minimally invasive modality of hemorrhage control circumvents the extensive tissue disruption resulting from surgical interventions [8,12]. However, AE techniques require expertise and resources that are not always readily available in many LMIC healthcare settings. As a consequence, the effectiveness and feasibility of AE for the management of traumatic injuries in such settings remains unexplored.

This study reviews the experience of a single university trauma center in South Asia that has been able to develop a robust mechanism for incorporating angiography and embolization in dealing with acute hemorrhagic trauma.

2. Methods

2.1. Study site and sampling

The Aga Khan University Hospital is a tertiary care trauma center in a large metropolitan city of Pakistan servicing a population of approximately 15.5 million people [13]. Medical records of all adults patients (≥16 years) requiring arteriography for poly-trauma at the angiography suite between January, 2011 and June, 2013 were retrospectively reviewed. Due to the retrospective nature of the study, it was exempted from ethical approval as per institutional policy. All patients who had been surgically managed for their injuries at an outside facility and those with incomplete medical records were excluded.

The trauma facility has an in-house trauma team that is headed by an on-call trauma surgeon. The team is able to provide 24-h trauma coverage. All patients received initial resuscitation based on the Advanced Trauma Life Support (ATLS) guidelines [14]. Contrast-enhanced computed tomography (CT) was used to identify active extravasation and for staging injuries. However, all hemodynamically unstable patients, or those demonstrating clinical signs of peritoneal irritation, were managed operatively at first.

2.2. Interventional radiological (IR) facilities at study site

The department of radiology at this trauma center is equipped with a state-of-the-art vascular and IR suite. This suite performs on average 10 IR procedures a day and remains operational for elective procedures from 8 AM to 5 PM. This study employed the expertise of three different interventional radiologists all of whom had completed certified post-graduate training in radiology, followed by an additional two-year or four-year fellowship training in IR procedures. Furthermore, all three have had more than five years of experience performing emergency AE procedures.

With the available resources, a robust protocol for performing emergency AE procedures has been developed. During routine timings (8 AM–5 PM), emergency IR procedures are rapidly performed in this suite by temporarily suspending elective procedures. At night a dedicated IR team is kept on standby, which can be called into action when needed. Once the protocol is activated, the IR team is mobilized to perform interventions.

In this study, a 64-slice multi-detector CT scanner (Aquilion 64®, Toshiba; Tokyo, Japan) was utilized for performing CT scans of trauma patients. Images were obtained after contrast injection and active contrast extravasation was identified by a consultant radiologist. These findings were then communicated to the primary surgical team. The emergency AE protocol was activated if deemed appropriate. The IR team was informed and the IR suite was prepared for the emergent procedure.

IR procedures within the IR suite were performed using a flat panel monoplane digital subtraction angiography machine (Axiom-Artis®, Siemens; Munich, Germany). The right or left groin was punctured to access the common femoral artery through a 4- or 5-Fr vascular access sheath (Cordis; Miami, FL). Diagnostic angiographies were typically carried out using 4-Fr Cobra (C1) Cordis, Renal Double Curve (RDC), Cordis or Simmons (SIM1) Cordis catheters. When active extravasation, pseudo-aneurysms, arteriovenous fistulae or abnormal blush were identified, the offending vessel was super-selectively cannulated using a microcatheter (Progreat, Terumo; Tokyo, Japan) to achieve as close a proximity to the lesion as possible. This was followed by AE using vascular occlusion microcoils to completely occlude the vessel implicated. In certain cases where abnormal blush or multiple areas were identified, polyvinyl alcohol (PVA) particles (Boston scientific; Marlborough, MA, USA) or gelatin sponge (Gelfoam, Pharmacia & Upjohn; Kalamazoo, MI, USA) were used, whereas microcoils (Balt Extrusion; Montmorency, France) were preferred in cases of focal vascular injuries. N-butyl cyanoacrylate (NBCA) glue (Trufill, Cordis; Miami, FL, USA) was also utilized, which offered the advantage of lower cost; however, it was sparingly used as meticulous technique was needed to avoid spillage into nearby vessels. Post-AE scanning was carried out to ensure occlusion of bleeding vessels.

Download English Version:

https://daneshyari.com/en/article/4285823

Download Persian Version:

https://daneshyari.com/article/4285823

Daneshyari.com