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Original Research Article

Prevalence of Vascular Injury Following Thoracic Surgery

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ABSTRACT

Introduction: One of the conditions that may lead to vascular trauma is surgery; Since thoracic surgeries are performed in the upper extremity and the injuries caused by vascular trauma in the upper extremities are more than other organs, the present study was performed with the aim of the prevalence of vascular injuries following thoracic surgeries. **Material and Methods:** This descriptive cross-sectional study was performed during 2020 in Imam Reza Hospital in Tabriz. All patients after thoracic surgery were included in this study and the number of postoperative vascular injuries recorded in their files was evaluated and their results were reported. **Results:** Among the total participants in the study, 21 [2%] patients had vascular injuries after surgery; Among the highest rate of vascular injury was in patients who were candidates for thoracotomy [n=14], followed by patients who were candidates for breast surgery [n=7]. No vascular damage was observed in patient's candidates for thoracoscopy. The most common injured artery was the subclavian artery [16 patients]; Thoracoscopically artery [5 patients] was in the second place. **Conclusion:** The prevalence of vascular injuries following thoracic surgery in the present study was about 8%; Thoracotomy and breast surgery were the most common surgeries in which vascular damage was seen.

Keywords: Prevalence, Thoracic Surgery, Vascular Injury

Introduction

Traumas are generally divided into penetrating and blunt groups. Penetrating trauma may be caused by sharp objects, bullets, or medical interventions [catheterization, surgery, etc.]. Blunt trauma is also commonly caused by rapid stopping of moving objects, compression injuries, falls from heights, bone fractures, and joint dislocations [1]. Traumas can cause damage to various organs of the body and many of these injuries can be irreparable, among which the arteries of the limbs, especially the arteries as the main source of blood supply are most exposed to damage [2]. Different types of arterial damage led to impaired blood flow to organs and tissue ischemia. Acute obstruction in the artery responsible for blood supply to the limb is considered an emergency and can cause irreversible ischemia within six hours if there is insufficient secondary arteries and the only source of blood supply to the organ is blocked [3, 29]. Therefore, early diagnosis and immediate treatment are extremely important and timely treatment, while re-establishing blood flow, will prevent the spread of clots to the distal arteries and venous system, resulting in irreversible ischemia, tissue necrosis and loss. The departure of the relevant member will be prevented [3, 4]. In general, about 90% of peripheral vascular injuries occur in the limbs. Among the arteries of the limbs, the femoral artery is the most common artery damaged by trauma, and penetrating trauma is the most common angiographic indication in limb trauma [5, 6, 30]. One of the conditions that may lead to vascular trauma is surgery; Since thoracic surgeries are performed in the upper extremity and the injuries caused by vascular trauma in the upper extremities are more than other organs, the present study was performed with the aim of the prevalence of vascular injuries following thoracic surgeries.

Material and Methods

This study is a cross-sectional descriptive study that aims to investigate the prevalence of vascular injuries following surgery; Therefore, all thoracic surgeries performed during 2020, which were performed in Imam Reza Hospital [Tabriz University of Medical Sciences], were evaluated by observing the inclusion and exclusion criteria. Inclusion criteria were patients who were candidates for thoracic surgery and patients over 18 years of age, and exclusion criteria included patients with vascular trauma who were candidates for surgery and dissatisfaction with participation in the study. Patients were included in the study by available sampling method and

evaluated. For this purpose, special forms including parameters of age, sex, type of surgery, place of surgery, time interval from the time of surgery to diagnosis of vascular injury, design and information were taken directly from patients and their files and entered in the forms. Angiography of the affected limb was performed and angiographic findings including damaged arteries, type of arterial injury [including complete arterial occlusion, external compression and spasm, arterial amputation with active bleeding, arteriovenous fistula and pseudoaneurysm] were identified and recorded. The collected data were entered into the SSSS statistical software [version 22]. Quantitative data were analyzed by descriptive statistics and qualitative data were evaluated by non-parametric tests. This study was carried out with the approval of the ethics committee of Tabriz University of Medical Sciences [NO: IR.TBZMED.REC.1398.009] and obtaining informed consent from all participants.

Results

During the mentioned period, 256 patients were candidates for thoracic surgery and underwent surgery. Of these, 75 patients were candidates for breast surgery [cancerous and non-cancerous], 35 patients were candidates for thoracoscopic surgery, and 146 patients were candidates for thoracotomy. The mean age of study participants was 59.89 ± 2.45 years; The mean age of patients candidates for breast surgery was 48.11 ± 5.25 years, the mean age of patients candidates for thoracoscopic surgery was 55.29 ± 4.55 years and the mean age of patients candidates for thoracotomy surgeries was 62.59 ± 9.52 years; Of all participants in the study, 152 patients were female and the rest were male. Among the total participants in the study, 21 [2%] patients had vascular injuries after surgery; Among the highest rate of vascular injury was in patients who were candidates for thoracotomy [n = 14], followed by patients who were candidates for breast surgery [n=7]. No vascular damage was observed in patients' candidates for thoracoscopy. The most common injured artery was the subclavian artery [N=16]; Thoracoacromial artery [N=5] was in the second place.

Table 1: Frequency of vascular injury

Type of vascular injury	N [%]
Complete arterial occlusion	3 [14.28%]
Effect of external compression and spasm	10 [47.61%]
Arterial amputation with active bleeding	6 [28.57%]
Pseudoaneurysm	2 [9.52%]

Discussion

Damage to peripheral arteries can be very life-threatening and can be life-threatening if severe. In terms of prevalence, arterial lesions account for about 75% of injuries from penetrating wounds. Peripheral arteries have almost the same prevalence of penetrating and non-penetrating injuries. The main criteria for arterial injury of the limb are: pulsed bleeding, decreased peripheral pulses, hearing of a bruise or trail when an arteriovenous fistula has formed, and a pulsating hematoma [7, 13-15]. Paleness or cyanosis and a decrease in the temperature of the perfused organ, as well as severe dilation of the distal superficial veins, may indicate a venous arterial fistula. The incidence of arterial damage in patients with the main symptoms is more than 90% [4, 8]. Anatomically, the radial artery starts from the depth of the cubital cavity and becomes superficial at the end of the radius bone, and finally joins the deep branch of the ulnar artery and forms the deep palm arch [9, 16-18]. The ulnar artery also starts from the cubital cavity and together with the ulnar nerve is located in front of the retinaculum flexor and finally joins the radial artery and forms the superficial palm arch. In cases where there are symptoms of ischemia, hematoma spread due to arterial injury, pseudoaneurysm and concomitant damage to the radial and ulnar arteries, if the damaged artery is not repaired, there is a risk of intermittent cloding or cold intolerance in patients with arterial ligation placed exponentially leads to an increase [10, 19-21]. Managing patients in a hospital emergency room has always been one of the concerns of emergency medicine specialists. Prioritization of clients according to the severity of injuries in trauma centers is very important and can have a direct impact on the treatment outcome of patients [22-24]. In patients with acute damage to radial and ulnar arteries referred to the emergency department, it is very important to take measures and medical care to the extent

that failure to take the necessary measures in time for severe arterial injuries may lead to irreparable damage to the patient [11, 25]. Based on the results of the present study, if arterial ligation is performed in the emergency room, on the one hand, a faster homeostasis is established for the patient and his condition reaches a stable state sooner, and on the other hand, other medical measures will be accelerated. In a patient who has a single arterial injury, it is possible that after repairing the damaged artery and considering the general condition of the patient, he will be discharged from the hospital at the same time and the patient's next visits will be performed on an outpatient basis [12, 26-28].

Conclusion

The prevalence of vascular injuries following thoracic surgery in the present study was about 8%; Thoracotomy and breast surgery were the most common surgeries in which vascular damage was seen. However, in patients under the supervision of the vascular surgery group, in cases where arterial ligation is performed, all medical procedures will be performed in the operating room and on an inpatient basis, which will increase the length of stay and treatment costs for patients. Based on the results of the study, it can be concluded that arterial ligation in the emergency department will play an important role in foster care of the patient and reduce his stay and thus reduce the emergency load

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