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Original Article:

Vascular injury pattern and workload; A tertiary care center experience from Sri Lanka

Dulanjana Ranasinghe¹ MBBs, Doel Arudchelvam² MBBS, MD (Surg), MRCS (Eng), FCSSL Rezni Cassim³ MBBS . MS . MRCS D Prof. Mandika Wijevaratne⁴ MBBS . MS. MD. FRCS D

Introduction

¹. Registrar in Vascular and Vascular injuries can lead to life-threatening haemorrhage Transplant Surgery, National and limb-threatening ischemia if not addressed promptly. In Hospital of Sri Lanka, Colombo. Sri Lanka the number of limb vascular injuries are increasing due to the increase in road traffic accidents (RTA). This study ². Senior lecturer, Department of describes the characteristics of patients who were operated Surgery, faculty of medicine, on following vascular injuries at the Accident and Emergency department theatre of the National Hospital Sri Lanka (NHSL)

from 2023 January to 2023 December.

Consultant Vascular and Transplant Surgeon, National Hospital of Sri Lanka, Colombo.

University of Colombo.

³. Professor in Surgery, Department of Surgery, Faculty of Medicine, University of Colombo.

⁴. Professor of Surgery, Department of Surgery, Faculty of Medicine, University of Colombo.

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Correspondence to:

Dr. Joel Arudchelvam E-mail: joelaru@srg.cmb.ac.lk Telephone : 0775409765

mechanism of injury, associated injuries, type of vascular repair done, type of skeletal fixation done, duration of the surgery and time duration from admission to theatre were

Methods

Results

There were 64.274 admissions to NHSL. Accident and Emergency (A & E) department from January to December of 2023. 14,616 (22.74%) of patients underwent surgeries at the A & E theatre complex. 103 of the admissions had vascular injuries, which needed surgical interventions. Therefore, vascular interventions account for 0.7 % of the total number of major surgeries. 90 cases were males (n = 90, 87.38%). The mean age was 37.13 years (15 to 73). The commonest cause for vascular injuries is RTA (n=46, 44.66%).50.47% had lower limb vascular injuries (n=54). 52.83% (n=56) were managed with the reversed saphenous vein (RSVG) interposition graft.

This study was a retrospective study done at the Accidents

and Emergency department theatre of the National Hospital

Sri Lanka (NHSL). Patient information was collected from the

theatre registry. The data on age, gender, mode of admission,

collected. Patients with incomplete records were excluded.

Conclusions

According to the results of this study, 0.16% of A & E admissions required vascular surgical interventions. 0.7% of surgeries were vascular surgeries. The commonest cause for vascular injuries was RTA (n=46, 44.66%). The majority, 52.83% (n=56) of the vascular repairs were done using RSVG. The outcome details are not presented in this study. This is a main drawback. Future countrywide study is needed to come to further conclusions.

Introduction

Unintentional or violence-related trauma causes 4.4 million deaths around the world and it accounts for 8% of all deaths. Road traffic accidents (RTA), homicides, and suicides are the three leading causes of mortality in ages 5 to 291. 0.4 to 1.6 % of all trauma patients sustain vascular injuries worldwide2. However vascular injuries are responsible for 20% of all deaths related to

trauma³. Vascular injuries can lead to life-threatening hemorrhage and limb-threatening ischemia if not addressed promptly.

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Vascular injuries occur due to penetrating and blunt trauma. Trauma can show a spectrum of patterns of injuries like laceration, transection, pseudoaneurysm, contusion, intimal flaps, intimal disruption, and external compression .

The first urgent vascular repair was done in 1759 by Dr. Hallowell after being encouraged by his colleague Dr. Richard Lambert. Before that, vascular injuries were managed with ligation only and led to high morbidity and mortality. To minimize the consequences of ligation of injured vessels, various types of methods are used to restore blood flow. Primary anastomosis, synthetic and autologous vascular grafts, temporary intravascular shunts (TIVS), and endovascular techniques are some of the methods of vascular restoration . Vascular injuries are very common in third-world countries like Sri Lanka due to the increasing number of road traffic accidents (RTA), industrial trauma, and interpersonal violence. Out of all causes, RTA is the leading cause⁴.

Methodology

This study was a retrospective analysis of all patients who were operated on following vascular injuries at the Accident and Emergency department theatre of the National Hospital Sri Lanka (NHSL) from 2023 January to 2023 December. Patient information was collected from the theatre registry. The data on age, gender, mode of admission, mechanism of injury, associated injuries, type of vascular repair done, type of skeletal fixation done, duration of the surgery and time duration from admission to theatre were collected. Patients with incomplete records were excluded. Data were analyzed with computer software.

Results

There were 64,274 admissions to NHSL, Accident and Emergency (A & E) Department from January to December of 2023. 14,616 (22.74%) of patients underwent surgeries at the A & E theatre complex. 1772 (2.76%) and 12844 (19.99%) of them were major and minor surgeries respectively. 103 of the admissions had vascular injuries, which needed surgical interventions.

Vascular injury pattern and workload

Therefore, vascular interventions account for 0.7 % of the total number of major surgeries done at the A & E theatre complex, NHSL. Number of the patients in the study was 103. The majority of them were males (n = 90, 87.38%). The mean age was 37.13 years (15 to 73). The age and gender distribution of the study group is presented in Table 1.

Table 1 Age and gender distribution

AGE	MALE	FEMALE	TOTAL	%
10-19	12		12	11.65
20-29	22	3	25	24.27
30-39	23	5	28	27.18
40-49	18	1	19	18.44
50-59	6	2	8	7.77
60-69	6	2	8	7.77
70-79	3		3	2.91
TOTAL	90	13	103	

The commonest cause for vascular injuries is RTA (n=46, 44.66%) and it is followed by interpersonal violent activities like assaults with sharp weapons and stabbing. Etiological distribution is presented in Graph 1.

Graph 1 Causes of vascular injuries



50.47% of all vascular trauma involved lower limb vessels (n=54). The distribution of the anatomical location of the vascular injuries is shown in Graph 2 and Table 2.

Graph 2 : Anatomical location of the vascular injuries





Table 2: Anatomical Distribution of Vascular Injuries

	Blood vessel damaged	Number of injuries	%
Upper Limb	Subclavian, Axillary Artery	2	1.89
	Brachial Artery	27	25.47
	Ulnar Artery	13	12.26
	Radial Artery	9	8.49
Lower Limb	Femoral Artery (Superficial		
	and Common)	13	12.26
	Femoral Vein	4	3.77
	Profunda Femoris Artery	1	0.94
	Popliteal Artery	30	28.3
	Anterior tibial Artery	2	1.89
	Posterior Tibial Artery	2	1.89
	Peroneal Artery	1	0.94
	Dorsalis Pedis Artery	1	0.94
Head and Neck	External Jugular Vein	1	0.94
	TOTAL	106	

The modality of the vascular surgical intervention depended on the anatomical site of the injury, type of the injury, duration from the time of injury to the hospital admission, and associated other injuries. 52.83% (n=56) was managed with an interposition graft with the reversed saphenous vein (RSVG). Very small segment contusions, where the intimal injury is minimal were managed with thrombectomy alone (n=10, 9.43%). The types of vascular intervention for injuries are presented in Graph 3.



Graph 3: Types of Vascular Surgical Interventions

Mode of admissions

49.51% (n=51) of admissions were transferred from local hospitals and the rest were direct admissions.

Graph 4 Mode of admissions



patients with vascular injuries were admitted to the NHSL between 20:00h to 00:00h (n=26). Minimum admissions reported from 0800h to 1200h.

Admission times of patients with vascular trauma are shown in Gragh 5.

Admission times of patients with vascular trauma



Graph 5 Times of admissions of patients with vascular trauma

Surgical interventions for vascular injuries are carried out by the vascular surgical team with the liaison of orthopedic and plastic surgical teams most of the time. 44.66% (n=46) surgeries took 2 to 4 hours. The mean time is 4.4 hours for surgery. Time durations for surgical interventions are shown in Graph 6.

A total of 440 hours within a year were spent on vascular surgeries.

Time duration for vascular surgical interventions





 1^{-2hr} 2^{-4hr} 4^{-6hr} 6^{-8hr} 8^{-10hr} >10hr >10hrMost of the admissions with vascular injuries underwent appropriate surgical intervention within 1 to 2 hours after admission (n=40). The

mean delay is 2.6 hours. Delay from the admission to the theatre was

analyzed and shown in Graph 7.

Delay from admission to vascular surgical intervention >10 HRS + DELAYED RERPAIRS 9-10 HRS 8-9 HRS 7-8 HRS 6-7 HRS 5-6 HRS 4-5 HRS 3- 4 HRS 2-3 HRS 1-2 HRS <1 HRS 0 5 10 15 20 25 30 35 40 45 50 Series 1



Discussion and conclusions

According to the results of this study, 0.16% of A & E admissions required vascular surgical interventions. 0.7% of surgeries were vascular surgeries and some of them were combined surgeries with orthopedic, plastic, or general surgical teams.

Male preponderance is an observed fact in the context of vascular injuries and 80% to 99% of vascular injuries occur in males in most studies⁵, our data is also consistent with these data, 87.38% of vascular trauma occurs in males.

In our study, the commonest cause for vascular injuries was RTA (n=46, 44.66%). When comparing this with data from other parts of the world, gunshots, stabs, and assaults are the predominant causes in some studies⁶. Some studies show RTA is the predominant cause

50.47% (n=54) of vascular trauma involves the lower extremity vessels and popliteal artery injury is the commonest injury in the lower limb(n=30) Brachial artery injury is the commonest upper limb vessel injury and accounts for 25.47% of the population. There are similar studies some are showing lower limb injuries than upper limb⁷, and others vice versa. The common vessels injured in the upper and lower limbs in our study are consistent with other studies.

The majority, 52.83% (n=56) of the vascular repairs were done using RSVG. Usually vascular trauma due to blunt trauma comes with long-segment contusions, and crush injuries in RTA. It requires tension-free repair after removing the damaged part of the vessel. This is consistent with studies done in other places.

59.8% (n=58) of vascular trauma admissions reach the theatre within the first two hours of admissions. The mean delay from admission to the theatre for vascular surgical intervention is 2 hours and 36 minutes. The timing from the admission to the theatre depends on the severity of the vascular trauma, degree of extremity ischemia, pre-hospital delay following the trauma, and associated other injuries.

A total of 440 hours of theatre time were spent from 2023 January to 2023 December for vascular trauma and the mean time for surgery is 4 hours and 24 minutes.

Our study has limitations. This study only includes the data of patients who underwent vascular surgical intervention by vascular surgeons at the A & E theatre complex for 2023 year. This data does not include on-arrival deaths due to vascular trauma, and vascular trauma where vascular surgical intervention was not needed like unsalvageable limbs. Since this is a retrospective study, only the patients with complete data were included in the study. The number of patients in the study is not adequate to get the exact prevalence and pattern of vascular injuries in the population. In addition the outcome details are not presented in this study. This is a main drawback. Future country-wide study is needed to come to further conclusions.

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ORCID iD

Dulanjana Ranasinghe https://orcid.org/0000-0001-5106-9436 Joel Arudchelvam https://orcid.org/0000-0002-4371-4527 Rezni Cassim https://orcid.org/0000-0002-4826-6196 Mandika Wijeyaratne https://orcid.org/0000-0001-9073-5446

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