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Research Article

OUTCOME OF EMERGENCY VASCULAR REPAIRS DONE BY GENERAL SURGEONS IN TERMS OF COMPLICATIONS, HOSPITAL STAY AND MORTALITY

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Abstract:

Natural calamities and civil wars have increased worldwide. There is huge burden of vascular surgical diseases and general surgeons are helping vascular surgeons to reduce surgical workload.

Objective: *To determine outcome of emergency vascular repairs done by general surgeons in terms of complications, hospital stay and mortality*

Study Design: *Retrospective study*

Setting: *General Surgery Emergency Department, Allied Hospital, Faisalabad.*

Methodology: *All patients of all age groups who required emergency vascular surgery, diagnosed by consultant surgeon at surgical emergency were included. Operations were performed after pre-anesthetic evaluation by consultant general surgeons. Variables including injury type, vessel injuries, injury severity score (ISS), surgical repair done, hospital stay, complications and mortality, were recorded from old data. Various complications after the surgery were compared with the type of repair done, age group and time till presentation after injury. The p-value <0.05 was considered significant. Limb amputation or mortality was taken as poor outcome.*

Results: *Retrospective data showed 135 patients with mean age 28.8 ± 11.5 years (14 -63) most of which were males (127 of 135) and 56% had road traffic accidents, 19% gunshot injuries and 25% injuries from sharp objects. Only 6% patients presenting within 30 mins of injury and around 50% patients reached within 3 hours. Three major peripheral arteries injured were brachial 38%, popliteal 40% and femoral (21%) with more than half with complete transection (55%). Vascular repairs done were primary anastomosis (33%), reverse saphenous vein graft (RSVG) 50.4%, embolectomy (3%) and amputation (13%). Limb salvage rate and mortality was 74.8% and 4.4%, respectively. Complications occurred in 38/135 (28.1%) cases with wound infection (18%) and myonecrosis (6.7%) on top. No complications after vascular repairs done by general surgeons were seen in 71.9% cases. Factors leading to poor outcome/complications were GCS ≤ 12 ($p=0.01$), referred case ($p=0.04$), significant bleeding ($p=0.004$), Hb ≤ 9 at presentation ($p=0.001$), bone fracture ($p=0.01$), involvement of lower limb and late presentation ($p=0.003$).*

Conclusion: *Late presentation in hospital is the major modifiable factor improvement of which can lead to better outcome, apart from the early and proper surgical intervention. The outcome of this study revealed preventable causes of limb loss and mortality in emergency vascular repair cases done by general surgeons.*

Keywords: *Vascular surgery, artery repair, venous graft, vascular anastomosis,*

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INTRODUCTION:

Delay of hours even minutes in surgical emergency can be hazardous and potentially life threatening in case of patient requiring emergency vascular surgery. The increasing cases of firearm injuries and invasive medical/surgical procedures have increased the incidence of vascular injury in the United States alone. Besides, road traffic accidents, natural calamities and civil war have increased cases worldwide.”

Besides high-speed motor vehicle accidents, industrial hazards, street crimes, terrorist activities all have contributed to excessive burden of vascular surgeries where there is no proper vascular surgery training institute and program to meet these huge number of cases. ’

The number of vascular applicants with US medical degrees decreased by 36% (107 in 1997 to 68 in 2004) during this time. The number of training positions available in vascular surgery programs accredited by the Accreditation Council for Graduate Medical Education has increased by 34% but the total number of active applicants to these programs decreased by 21%. In a 6th most populous country with 200 million people, Pakistan has only 2 vascular surgery programs. Which are why, general surgeons are handling vascular surgery cases as well. ⁴.

Escalating numbers of vascular surgical disease in growing elderly population also adds the burden of vascular surgery to general surgeons in Pakistan. But data shows 62% higher mortality rate when the vascular surgery was performed by a general surgeon rather than a vascular surgeon. ⁵.

Methicillin-resistant *S. aureus* has emerged as the leading cause of postoperative infection in vascular surgery patients however; MRSA had no higher rates of morbidity or mortality except for increased length of hospital stay when compared to patients with MSSA. ”

Vascular and cardiac surgeons have handled significant number of surgical cases so vascular operations performed by them are naturally expected to have better outcomes. In contrast, general surgeons

have to build up proficiency in many other surgical procedures as a result they have minimal time to expand skill in vascular procedures. ⁸ In our country, there is huge burden of vascular surgical disease and large numbers of general surgeons are helping minimal number of vascular/ cardiac surgeons to reduce surgical workload. The rationale of our study is to measure the outcome of emergency vascular surgery performed by general surgeons in terms of rate of mortality, duration of hospital stay, need of reoperation and to reveal preventable cause of mortality to improve prognosis.

MATERIAL AND METHODS:

This retrospective study was done in the General Surgery Department, Allied Hospital, Faisalabad. Total 135 cases were studied from admission till discharge starting from Jan, 2014 to May, 2019. Cases who had emergency vascular exploration and repair; and those who required emergency vascular surgical intervention admitted through general surgical emergency department were included in the study.

The primary objective of the study was to determine the outcome of emergency vascular repairs done by general surgeons in terms of complications, hospital stay and mortality. Outcome in this study was measured by calculating duration of hospital stay and rate of mortality. Hospital stay was measured in terms of duration from date of admission to date of discharge from ward.

All patients either gender or any age group who presented in the surgical emergency and emergency vascular exploration and repair was done, was included. Exclusion criteria: Patient who required emergency vascular surgical intervention admitted

through all departments other than general surgical emergency department who were referred to cardiac or vascular surgery department per operatively or postoperatively.

Data was extracted from the departmental patient's record system. Data of all patients of all age group who required emergency vascular surgery, diagnosed by consultant surgeon at surgical emergency bay admitted at General surgery department, was documented on a designed performa. Total number of 135 cases were studied.

All these cases were done after pre-anesthetic evaluation and getting fitness for general anesthesia from the department of anesthesia. Patients were kept nil per oral for at least 4 hours prior to surgery. All the surgeries in this study were done by consultant surgeons or under direct supervision of consultant surgeons of general surgery department. The average hospital stay of patient who underwent emergency vascular surgery is 7 days in general surgery department in Mayo hospital, King Edward Medical University.

Data from all these emergency vascular surgical cases which fulfilled inclusion criteria were assessed

for associated bleeding disorder, coagulation disorder and other associated medical or surgical illness and included in study accordingly. With this we were able to check the rate of mortality, duration of hospital stay and guided us to acknowledge preventable cause of mortality.

Collected data from Performa was entered to SPSS version 20 and was analyzed. All the qualitative variables were analyzed to see the frequency and percentages. And all the quantitative variables were analyzed to see the mean and standard deviations. Frequencies of various post-operative complications, limb amputations and mortality after emergency vascular repairs were calculated. Tables and graphs were used to represent the results.

RESULTS:

In this retrospective study, data of 135 patients was analyzed. Mean age of these patients was 28.8 ± 11.5 years (range 14 – 63 years). Majority of the patients were of male gender (127 of 135, rest were females). Etiologies leading to emergency presentation was road traffic accidents (blunt trauma) in 56.3% cases, 19.3% in gunshot/firearm injuries (penetrating) and 25% sharp object injuries (stab injury, glass injury, and machine injury).

Table 1: showing the various surgical procedures done in the emergency by general surgeons

Variable		No.	%
Surgical Procedure Done	Primary Anastomosis	45	33.3
	RSVG	68	50.4
	Primary Amputation	18	13.3
	Embolectomy	4	3.0
	Adjuvant Extremity Surgery	External Fixator of Bone	14
	Vein Ligation	18	13.3
	Vein Repair or Graft	6	4.4
	Nerve Repair	12	8.9
	POP cast	3	2.2
	Debridement Only	53	39.3
	Ext.Fixator+Vein Ligation	24	17.8
	Ext.Fixator+Vein Repair+Nerve Repair	5	3.7
Fasciotomy	No	65	48.1
	Yes	70	51.9
Complication after surgery	Wound Infection	24	17.8
	Myonecrosis	9	6.7
	Graft Failure	4	3.0
	Bleeding/Hematoma	1	.7
Limb salvage	Limb Salvaged	101	74.8
Amputations	Amputated (Primary+Secondary)	34	25.2
Patient outcome (mortality)	Discharged	129	95.6
	Expired	6	4.4
Hospital stay in days (mean \pm SD)		range: 11 ± 3.92	4 - 22 days

Complications occurred in 38/135 (28.1%) cases with wound infection (18%) and myonecrosis (6.7%) on top. No complications after vascular repairs done by general surgeons were seen in 71.9% cases. (Table 2)

Factors leading to poor outcome/complications were GCS ≤ 12 ($p=0.01$), referred case ($p=0.04$), significant bleeding ($p=0.004$), Hb ≤ 9 at presentation ($p=0.001$), bone fracture ($p=0.01$), involvement of lower limb and late presentation ($p=0.003$).

Data regarding the experience and skills of general surgeons who performed these vascular repairs showed that 2/3rd of them were having experience of more than more than 2 years after their specialization/fellowship and mostly were of age between 30 to 40 (97%) and 91% showed interest in performing vascular surgeries.

DISCUSSION:

Multiple causes leading to peripheral vascular injuries include road traffic accidents, firearm injuries, cut throat injuries; accidents leading to sharp injuries, and rupture of major artery aneurysm. Many patients present in our accidental emergencies on daily basis with minor or major vascular injuries who need arterial repairs; vascular surgeons are not available in all emergencies round the clock. Most of these cases are seen by general surgery consultants with some experience of vascular repairs. This study was done to determine the outcome in terms of complications, limb amputations and mortality after these arterial repairs done by general surgeons in the accidental emergency in Allied hospital, Faisalabad; and to study factors related to surgeon skill and experience, leading to these complications.

A study reported that among the patients of vascular repairs 79% of the consultations, needed urgent vascular repairs including ischemia cases of the limbs, aortic disease, and some iatrogenic injuries.¹¹

In a similar study, some cases were done to help out the general surgeons and other minor surgery specialty. Most of these consultations were to do vascular repairs and control bleeding.

A local study reported after collecting data from 21 non-vascular surgeons, which showed that only 14% had exposure of vascular repairs. A workshop was conducted and knowledge was accessed. Gain-in-knowledge was seen in 21% participants, and conclusion was made that properly designed workshops on vascular repairs can improve the knowledge and skill of non-vascular surgeons.

Most studies based on structural measures considered the introduction of a clinical pathway or a registration system. Reports based on process measures showed promising results. Outcome as clinical indicator mainly focused on identifying risk factors for morbidity, mortality or failure of treatment.⁹

In a study, similar to ours, conducted on the management of popliteal artery injuries reported that among the patients with blunt etiologies had major loss of tissue, had relatively more hospital stay. And chances of amputations were more in cases with longer hospital stay and PTFE grafting. Overall mortality in this study was 8.5%. The outcome of our study was way better than that reported in this study.

Similar to our results, another study on lower limb vascular repairs reported that vascular repairs after popliteal injuries were mostly due to blunt injury in 55%, penetrating in 45 % cases; and amputation rate was of 28%, with more than 80% in blunt trauma cases; this was close to our study. Analysis of follow-up data after one year showed that 35% cases had limitation in activity.

In a study on popliteal artery injuries, most common cause was firearm injuries (97.5%), rest has stab injuries 1.5% and blunt trauma in less than 1% cases. Frequency of amputation was 19% due to extensive injuries and delay in the presentation in emergency, with overall mortality of 4.7%.

In a study done on limb vascular repairs, data of 135 patients was analyzed; Only 1 patient had primary amputation. Among the patients with vascular repairs, 4% cases had major and minor amputations with no mortality.

Another 5 years study showed similar results as those of our study, data of 65 cases was analyzed showing that amputations were done in three patients (4.6%), fasciotomies were done in 38% cases. Three patients (4.6%) expired during hospital stay.

A study showed data of 81 patients that venous grafting the common repair done (60%); Fasciotomy done in more than half of the cases (68%). The limb salvage rate was 82.7% and amputations were more in blunt trauma patients and the mortality was 8.6%. These results were also close to those we reported.

A study of 36 cases of arterial injuries when repaired in ER showed overall limb salvage rate of 65% and those with presentation after 12 hours had poor

outcomes. In a study done to analyzed the patients of vascular repairs done by general surgeons and their exposure in their learning curve. It was reported that the exposure of vascular repairs of general surgeons is decreasing with advancement in the healthcare system.

Training and practice of vascular repairs of general surgeons working in the emergencies is important to improve the surgical skills. Vascular surgeons cannot be consulted on every vascular injury on time. With involvement of skilled general surgeons on time in the surgical emergency, mortality can be reduced with better limb salvage rate with early intervention.

CONCLUSION:

Outcome of the vascular repairs done by general surgeons can be further be improved with better exposure of such cases.

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