

ARTERIAL INJURIES IN CIVILIAN PRACTICE IN LAGOS, NIGERIA

M.O. Thomas, S.O. Giwa, T.O. Adekoya-Cole

Department of Surgery, College of Medicine of University of Lagos (CMUL) / Lagos University Teaching Hospital, Idiara

ABSTRACT

Objective: This is a retrospective study of patients managed at the Lagos University Teaching Hospital for peripheral arterial injuries from January 1995 to April 2003. The aim was to study the pattern of peripheral arterial injuries in Lagos, Nigeria and to look at the outcome of management and see what improvements could be made in future.

Method: Data was collated from case notes of patients, operation register in theatre and admission and discharge books from the surgical wards and the data bank of consultants involved in patients' management.

Result: Forty-one patients, 37 males and 4 females, were treated within the study period (M:F ratio of 9:1). Twenty three patients (56.1%) suffered gunshot injuries during armed robbery attacks while 9 patients (22.0%) had stab injuries in civilian violence.

Twenty-one patients (3 with gunshot injuries and 18 non gunshot penetrating injuries) were managed by direct suturing of vessels. Eight patients had prosthetic graft interposition while 2 patients had reversed saphenous vein grafts. Two patients had the superficial branches of their radial arteries tied up at the wrist.

Conclusion: Gun shot injuries from armed robbery attack was the commonest cause of peripheral arterial injuries in this environment during the period of study.

Key Words: Arterial Injuries, Civilian Practice, Lagos

INTRODUCTION

Major peripheral arterial injuries occur worldwide and any of the major peripheral arteries can be affected¹⁻¹². Peripheral arterial injuries (PAI) occur in civilian and military practice and they are encountered by vascular and trauma surgeons alike^{2,3,4}. In a retrospective study by Olasinde and his colleagues³ at Ile-Ife in south-western Nigeria, peripheral vascular compromise was the single most common reason for amputation following road traffic accidents.

In another retrospective study of 52 cases of vascular injuries by Igun and his colleagues¹² in Jos, in the middle belt zone of Nigeria, road traffic accident caused 44% of the injuries. Other known causes include penetrating trauma as in stabs and machete cuts and also blunt trauma in contact spots and falls among others^{11,13}. Males are usually more frequently affected than females^{11,12}. Vascular injuries, either blunt or penetrating, are more frequently isolated rather than as part of multiple trauma¹.

In emergency situations, the use of diagnostic investigations like angiography is not emphasized

because such procedures only increase intervention time, even in developed countries where such facilities are readily available.

However, in non-emergency situations, diagnosis may involve peripheral arteriogram, doppler and/or duplex scanning. These are very useful in determining the anatomical details of arteriovenous fistulae and false aneurysms, which are possible sequelae of arterial injuries¹⁴.

The urgency of instituting definitive treatment is variable. Patients who have haemodynamic instability require immediate infusion of crystalloids and an attempt at securing haemostasis while efforts are on for definitive repair of the damaged vessel. The common modalities of treatment of peripheral arterial injuries include conservative approach, direct repair, interposition grafting or bypass reconstruction and in some cases ligation⁸.

Postoperative rehabilitation may be needed in some cases. This may be in form of occupational therapy or the use of prosthesis especially following limb losses and ischaemic contractures.

We decided to study the pattern of peripheral arterial injuries in our locality with the aim of determining the aetiology, and management profile of the injuries based on the belief that a peep into the

Correspondence: Dr. M. O. Thomas.

past could help to improve the future management of such injuries.

PATIENTS AND METHODS

All cases of peripheral arterial injuries, managed jointly by the Cardiothoracic and Orthopaedic/Trauma Units at the Lagos University Teaching Hospital from January 1995 to April 2003, were retrospectively reviewed. Data were obtained from patients' case files, operation register admission and discharge books on surgical wards and personal records kept by the various consultants involved. The review was limited to patients who had involvement of major arteries of the limbs and head and neck regions.

The patients' biodata were compiled, as well as information on aetiology, arteries involved, associated injuries and management modalities. Record of postoperative patency of anastomosis, confirmed clinically by the presence of distal pulses and other clinical evidence of distal perfusion, were noted. We used the chi-square test to analyse male dependence and regional occurrence of gunshot injuries to peripheral arteries.

The results of the various management modalities in the immediate post-operative period and during follow-up for at least one-year were reviewed. Complications arising from the initial trauma as well as from the surgical intervention were noted.

RESULTS

There were altogether 41 patients studied, comprising of 37 males and 4 females, giving a male:female ratio of 9:1. (Table 1). Majority (78%) of the patients were in the 20 – 39 years age group with a mean of 32.1 ± 10.4 years.

The femoral artery was involved in 51.2% of all cases (Table II). One case of common carotid arterial injury was recorded resulting from festival fire works. It is noteworthy that there was no patient with multiple arterial injuries.

The causes of the injuries are depicted in Figure 1. Twenty-three (56.1%) of our patients suffered gunshot injuries during armed robbery attacks (Table III). Civilian violence and road traffic accidents accounted for 22.0% and 17.1% respectively. Being a retrospective study, we could not ascertain the types of guns used. Five (12.2%) of the patients had associated bone injuries and 2 (4.9%) patients had peripheral nerve injuries in addition to their vascular injuries.

Using the chi-square test of dependence of male factor on gunshot peripheral arterial injuries, we found χ^2 calculated $< \chi^2_{\alpha}$ at $P=0.05$ and $P=0.01$ (1 degree of freedom). This confirmed the fact that males were more prone to peripheral arterial injuries than females.

Similarly, we tested the predisposition of upper limbs or lower limbs arteries to gunshot injuries χ^2 calculated $>> \chi^2_{\alpha}$ at $P=0.05$ and $P=0.01$ (1 degree of freedom). The H_0 : lower limb vessels were not more prone to gunshot injuries were rejected and we accepted H_1 : that lower limb vessels were more prone to gunshot injuries.

Pre-clotted woven Dacron interposition graft was used for 8 (19.5%) patients (Table IV) who had ragged arterial segments resulting in loss of vessel length following injuries. We used 6.5mm grafts for 7 injured femoral arteries and one 5.5mm graft for an injured brachial artery. Other methods of treatment included ligation of superficial branches of radial arteries in two patients, reversed saphenous vein grafting in two and limb amputation in four patients. Reversed saphenous vein grafts were used to repair two injured femoral arteries because we had experienced assistants who could crop the vessels while the thigh dissection was going on. This considerably shortened the operation time in the two cases.

Two cases were managed conservatively. Their injuries were non-penetrating and repeated examination over 48 hours showed progressive clinical improvement.

Four above-knee amputations were performed because the patients presented late with features of irreversible ischaemia of their legs and feet. Two patients died before definitive intervention. All the repaired vessels were patent one year after surgery.

Table 1: Age and Sex Distribution

Age Range (Yrs)	Males	Females	Total (%)
0 – 9	1	-	1(2.4%)
10- 19	1	-	1(2.4%)
20 – 29	9	3	12(29.3)
30 – 39	19	1	20(48.8)
40 – 49	1	-	1(2.4)
50 – 59	2	-	2(4.9)
60 - 69	1	-	1(2.4)
Unknown	3	-	3(7.3)
Total	37(90.2%)	4 (9.8%)	41 (100%)

Table II: Arteries Involved

	Arteries Involved	No of Patients
A.	Head and Neck	
	Carotid	1 (2.4%)
B.	Upper Limbs	
	Axillary	2 (4.9%)
	Brachial	12 (29.3%)
	Radial/Ulnar	3 (7.3%)
C.	Lower Limbs	
	Femoral	22 (51.2%)
	Popliteal	1 (2.4%)
TOTAL		41 (100.0%)

Table III: Mechanisms of Injury

Mechanisms of Injury	Patients Involved
Road Traffic Accident	7 (17.1%)
Civilian Gunshot (Armed Robbery)	23 (56.1%)
Stabs, Sharp Objects etc	9 (22.0%)
Others e.g. Iatrogenic	2 (4.9%)
Total	41(100.0%)

Fig. 1: Pie Chart showing the mechanisms of injury

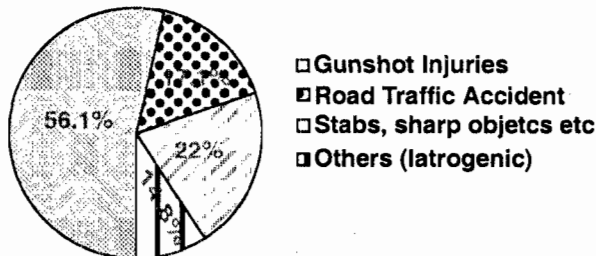


Table IV: Methods of Management

Method	No of Cases
Conservative Management	2 (4.9%)
Ligation	2 (4.9%)
Direct Suturing	21 (51.2%)
RSVG **	2 (4.9%)
ProstheticGraft Interposition	8 (19.5%)
Amputation	4 (9.8%)
Died before intervention	2 (4.9%)
Total	41(100.0%)

** Reversed Saphenous vein graft.

DISCUSSION

This study demonstrates that peripheral arterial injuries in Lagos resulted mostly from gunshot wounds and they occurred more frequently in men than women during the studied period. These

injuries occurred mostly in the 20 – 39 years age group. Iatrogenic causes were found in 4.9% of the cases. This is much higher than in earlier reports by Kelsch et al⁷ and Eren and his colleagues⁸. The occurrence of gunshot injuries in 56.1% of cases studied is also higher than the 37.7% found in a similar period of peace in Turkey⁹.

The lower limb arteries were more prone to gunshot injuries than the upper limb vessels as demonstrated in the study. It is our belief that the femoral and brachial arteries were more prone to injuries than others because of their long courses.

We recorded isolated vascular injuries in all the patients (100%) studied. This is much higher than the 58.6% occurrence in the 15-year study of Ravadnadze³. In the same study, a greater percentage of their patients had bone and nerve

injuries than our study population. All these suggest greater impact trauma among the Georgians when compared with the Nigerian population.

We recorded a lower amputation rate of 9.8% compared with 24.1% seen in civilian vascular trauma in India¹⁰. The amputation rate could be further reduced with improved health care delivery system and early presentation.

In view of the fact that gunshots from armed robbers constitute a major cause of peripheral arterial injuries in our environment, improved security measures would bring the incidence of peripheral arterial injuries down significantly.

Also, an important need here is improved trauma response ambulance system so that trauma victims can get to hospital quickly.

REFERENCES

1. Creagh TA, Broe PJ, Grace PA, Bouchier-Hayes DJ. Blunt trauma-induced upper extremity vascular injuries. *J R Coll Surg Edinb* 1991; 36(3): 158 – 160.
2. Pan B, Zhang G. Severe vascular injuries following total hip replacement. *Chung Hua Wai Ko Tsa Chih* 1997; 35(8): 453 – 455.
3. Razmadze A. Vascular injuries of the limbs: A fifteen-year Georgian experience. *Eur J Vasc Endovasc Surg* 1999; 18(3): 235 – 239.
4. Katsamouris AN, Steriopoulos K, Katonis P, Christou K, Drositis J, Lefaki T, Vassilakis S, Dretakis E. Limb arterial injuries associated with limb fractures: clinical presentation, assessment and management. *Eur J Vasc Endovasc Surg* 1995; 9(1): 64 – 70.
5. Karlander LE, Gustavsson U, Lidman D, Sjoberg F. Severe contusion of the femoral vessels in rats alters tissue oxygenation and microvascular blood flow regulation in the skeletal muscles of the limb *J Trauma* 2000; 48 (2): 286- 291.
6. Paling AJ, Viersma JH. Blunt trauma of the common femoral artery. *J Pediatr Surgery* 1999; 34 (10) 1: 1557 – 1558.
7. Kelsch G, Savvidis E, Jenal G, Parsch K. Concomitant vascular complications in supracondylar humerus fractures in Children. *Unfallchirurg.* 1999; 102(9): 708 – 715.
8. Eren N, Ozgen G, Ener BK, Solak H, Furtun K. Peripheral Vascular injuries in children. *J Pediatr Surg* 1991; 26 (10): 1164 – 1168.

9. **Eren N, Ozgen G, Gurel A, Ener BK, Furtun K.** Vascular injuries and amputation following limb fractures. *Thorac Cardiovasc Surg* 1990; 38 (1): 48 – 50.
10. **Bhargava JS, Kumar R, Singh RB, Makkar A.** Civilian Vascular Trauma: an experience of 54 cases. *J Indian Med Assoc* 1996; 94 (2): 47 – 49.
11. **Olasinde AA, Oginni LM, Bankole JO, Adegbehingbe O, Oluwadiya KS.** Indications for amputations in Ile-Ife, Nigeria. *Nig. J. Med.* 2002; 11(3): 118 -121.
12. **Igun GO, Nwadiaro HC, Sule AZ, Ramyil VM, Dakum NK.** Surgical experience with management of vascular injuries. *West Afr J Med* 2001; 20 (2): 102 – 106.
13. **Anyanwu C H, Umeh BU, Swarup AS.** Experience with civilian vascular injuries in Eastern Nigeria. *Angiology* 1982; 33(2): 90- 97.
14. **Rickman M, Saleh M, Gaines PA, Eyres K.** Vascular complications of osteotomies in limb reconstruction. *J. Bone Joint Surg [Br]* 1999; 81(5): 890 – 892.