

RADIAL ARTERY TOTAL RUPTURE in 40th YEAR OLD MALE

Decky Ario,¹ Artono Isharanto,² Imam Suseno Bayuadi²

¹Department of Surgery, Faculty of Medicine, Universitas Brawijaya, Saiful Anwar General Hospital, Malang, Indonesia.

² Department of Cardiovascular and Thoracic Surgery, Faculty of Medicine, Universitas Brawijaya, Saiful Anwar General Hospital, Malang, Indonesia.

Corresponding author: Decky Ario; Department of Surgery, Faculty of Medicine, Universitas Brawijaya, Saiful Anwar General Hospital, Malang, Indonesia; Email: marselramagrandita91@yahoo.com

Abstract

Introduction: Acute traumatic arterial injury in connection with fracture is one of the most serious conditions as regards traumas of the extremities. As compared to other states causing insufficiency of circulation in the extremities. As a consequence, many cases of this kind with fracture and arrest or disturbance of blood flowing to arterial lesion have led to loss of the extremity or to disability on account of claudication, muscular atrophy, pareses and coldness.

Case Presentation: A 40-year-old man presented at Saiful Anwar Hospital came to ER suffered from pain in right forearm after motorcycle accident 2 hours before admitted to ER, his forearm got drilled by other vehicle, cannot move right forearm and felt numbness in right all finger. No history of loss of consciousness, chest pain, local edema, shortness of breath and abdominal pain.

Discussion: Autologous saphenous vein grafting has been broadly used as a bypass conduit, interposition graft, and patch graft in a variety of operations in cardiac, thoracic, neurovascular, general vascular, vascular access, and urology surgeries, since they are superior to prosthetic veins. Modified saphenous vein grafts (SVG), including spiral and cylindrical grafts, and vein cuffs or patches, are employed in vascular revascularization to satisfy the large size of the receipt vessels or to obtain a better patency. A loop SVG helps flap survival in a muscle flap transfer in plastic and reconstructive surgery.

Conclusion: A 40-year-old man came to ER after motorcycle accident, suffered pain in right forearm, numbness on fingers, and cannot move his forearm 2 hours before admitted to ER. From physical examination we found that there was loss of radial artery with missing part of artery, the saturation starting decrease. We choose perform emergency repair of artery, the situation we decided interposition graft with saphenous great vein, because from one of the research have successful rate and patency flow of artery about 86% in acute phase. The results from our worked, is fascinating and show good progress from clinical pattern.

Keywords: Radial Artery Total Rupture, Endovascular Embolization

INTRODUCTION

Acute traumatic arterial injury in connection with fracture is one of the most serious conditions as regards traumas of the extremities. As compared to other states causing insufficiency of circulation in the extremities. As a consequence, many cases of this kind with fracture and arrest or disturbance of blood flowing to arterial lesion have led to loss of the extremity or to disability on account of claudication, muscular atrophy, pareses and coldness. The first step in the management of this condition is to provide active hemorrhage control. Upper extremity arterial injuries constitute up to 50% of peripheral vascular injuries.¹ Penetrating injury to the forearm is a less common subset of upper extremity trauma. Lacerations of the forearm and wrist by knife, glass or machinery (often from occupational injury), are frequent to both the radial and ulnar arteries. At this time there was a major change in the management of vascular trauma so that the rate of amputation can be reduced to 13% compared with 49% in the second world war. At the time of the Vietnam War this figure is still around 13%. In the Vietnam war the amputation resulting from a brachial artery injury was about 5%. Only 2% of brachial artery injuries are ligated, but nearly 60% of radial artery injuries and 75% of ulnar arteries are ligated, as there is little possibility of ischemia.²

Reports of the II World War experience, when arterial traumatism was treated solely by arterial ligation, relate a 5.1% rate of amputation in injuries to the radial artery, 1.5% for the ulnar artery and of 39% in case of concurrent injury. Should only one of the forearm arteries be injured, with no evidence of ischemia, it might be ligated with little risk of sequelae. Such was the approach used in 33% of patients in our casuistry. In presence of ischemia or concurrent injury of the radial and ulnar arteries, arterial restoration must be performed. In three of the 11 cases with isolated arterial injury (radial, ulnar or interosseous) perfusion of the hand suffered alteration, therefore a graft with inverted saphena was performed in two of them and a lateral suture in the other. Of the 13 cases with injury to both arteries of the forearm, for ten of the cases restoration of only one of the arteries was undertaken. In the remaining three, restoration of both was carried out, as ischemia of the fingers persisted after repair of the first one.³

Revascularization performed on the patient depends on the trauma. If the gap that arises small can be done primary repair. If the gap is large enough may be used graft of the cephalic vein or of the saphenous vein. All grafts must be closed with a viable network. Vein repairs are rarely done because of their large collateral tissue. Critical ischemia time for the brachial artery is about 4 hours. Although there is a collateral that feeds his orifice, these blood vessels should still be repaired within 12 hours. Approximately 25% performed repair after 12 hours, only 25% whose function is recovered again. Autologous saphenous vein grafting has been broadly used as a bypass conduit, interposition graft, and patch graft in a variety of operations in cardiac, thoracic, neurovascular, general vascular, vascular access, and urology surgeries, since they are superior to prosthetic veins. Modified saphenous vein grafts (SVG), including spiral and cylindrical grafts, and vein cuffs or patches, are employed in vascular revascularization to satisfy the large size of the recipient vessels or to obtain a better patency. A loop SVG helps flap survival in a muscle flap transfer in plastic and reconstructive surgery.⁴

CASE PRESENTATION

Name : P
Sex : Male
Age : 40 years old
Job : Employee
Address : Malang

Registration number : 11352799

Anamnesis

Chief complaint : Pain in right forearm

Additional complaint : Cannot move right forearm and numbness in finger

History of present illness :

Patient came to ER suffered from pain in right forearm after motorcycle accident 2 hours before admitted to ER, his forearm got drilled by other vehicle, cannot move right forearm and felt numbness in right all finger. No history of loss of consciousness, chest pain, local edema, shortness of breath and abdominal pain.

History of last illness :

- No history of diabetes mellitus
- No history of heart disease and hypertension
- No history of smoking

Physical findings:

Vital signs :

Blood pressure : 130/80 mmHg

Pulse rate : 98x/minute

Breathing rate : 20x/minute

Temperature : 36.9°C

General Status:

Eye : anemic conjunctiva -/-, scleral icteric -/-

Thorax

Cor : regular heart sound I-II, no gallop, no murmur

Pulmo : vesicular breathing sound both lungs, no ronchi, no wheezing
Spontaneous and symmetrical breathing

Abdomen

Inspection : No bruise

Auscultation : Normal Bowel sound, no bruit

Percussion : Tympanic

Palpation : soft, no tenderness and mass

Extremity : CRT < 2"

Right wrist :

Look : Open wound, loss of part of artery radial, clot (+), redness in finger

Feel : Tenderness, warm

Pulsation in Radial artery : (-)

Pulsation in Ulnar artery : (+)

Pulsation in Brachial artery : (+)

Movement : Limited

SaO₂ Dig. I – V : 94 - 97%

Diagnostic findings:
Laboratory findings :

July 25 th 2017		
Hb	14.20 g/dL	13.4 – 17.7
Leukocyte	12,650 /mcl	4.3 – 10.3 10 ³
Hematocrit	44%	40 – 47
Trombocyte	357.000 /mcl	142 – 424 10 ³
PPT	10.20	9.4 – 11.3
APTT	26.20	24.6 – 30.6
SGOT	22 U/L	0 – 43
SGPT	23 U/L	0 – 41
Albumin	3.85 g/dL	3.5 – 5.5
GDS	118 mg/dL	< 200
Ureum	48.40 mg/dL	16.6 – 48.5
Creatinine	0.87 mg/dL	< 1.2
Natrium	139 mmol/L	136 – 145
Kalium	3.85 mmol/L	3.5 – 5.0
chloride	104 mmol/L	98 – 106

Clinical findings :



Right Antebrachii AP/Lat x-ray :



Working Diagnosis

Total rupture of radial artery with loss of artery
OF distal radius ulna gr. IIIC

Treatment

Interposition graft (with Saphenous great vein) + repair radial artery
External fixation

Operation



(A)



(B)



(C)

(A) Loss of radial artery (B) Saphenous great vein (C) After interposition graft and repair artery

DISCUSSION

Acute traumatic arterial injury in connection with fracture is one of the most serious conditions as regards traumas of the extremities. As compared to other states causing insufficiency of circulation in the extremities. As a consequence, many cases of this kind with fracture and arrest or disturbance of blood flowing to arterial lesion have led to loss of the extremity or to disability on account of claudication, muscular atrophy, pareses and coldness. Reports of the II World War experience, when arterial traumatism was treated solely by arterial ligation, relate a 5.1% rate of amputation in injuries to the radial artery, 1.5% for the ulnar artery and of 39% in case of concurrent injury. Should only one of the forearm arteries be injured, with no evidence of ischemia, it might be ligated with little risk of sequelae. Such was the approach used in 33% of patients in our casuistry. In presence of ischemia or concurrent injury of the radial and ulnar arteries, arterial restoration must be performed. In three of the 11 cases with isolated arterial injury (radial, ulnar or interosseous) perfusion of the hand suffered alteration, therefore a graft with inverted saphena was performed in two of them and a lateral suture in the other.^{5,6}

Revascularization performed on the patient depends on the trauma. If the gap that arises small can be done primary repair. If the gap is large enough may be used graft of the cephalic vein or of the saphenous vein. All grafts must be closed with a viable network. Vein repairs are rarely done because of their large collateral tissue. Critical ischemia time for the brachial artery is about 4 hours. Although there is a collateral that feeds his orifice, these blood vessels should still be repaired within 12 hours. Approximately 25% performed repair after 12 hours, only 25% whose function is recovered again. Autologous saphenous vein grafting has been broadly used as a bypass conduit, interposition graft, and patch graft in a variety of operations in cardiac, thoracic, neurovascular, general vascular, vascular access, and urology surgeries, since they are superior to prosthetic veins. Modified saphenous vein grafts (SVG), including spiral and cylindrical grafts, and vein cuffs or patches, are employed in vascular revascularization to satisfy the large size of the recipient vessels or to obtain a better patency. A loop SVG helps flap survival in a muscle flap transfer in plastic and reconstructive surgery.^{7,8}

From this case, based on history of motorcycle accident and have loss of radial artery, with numbness symptom and cannot move his forearm 2 hours before admitted, from golden period sight, performed emergency repair of vessels, we did interposition graft from saphenous great vein, and the results, radial artery were pulsating. The results after surgery was fascinating, we choose repair with interposition rather than by pass, because we evaluate the artery still have patency of flow to the distal. After few days of observation, the numbness was gone, slowly move the fingers though have external fixation with in the wrist.^{9,10}

Autologous SV grafting is popularly used in vascular surgery as a bypass graft, for the relief of hand and forearm ischemia, reconstruction of the axillary artery, or the brachial artery in an upper extremity, and femoropopliteal, femorotibial, plantar or lateral tarsal, tibioperoneal, and dorsalis pedis artery bypasses in a lower extremity. A femoropopliteal and femorotibial SVG bypass on 594 patients rendered a 5-year cumulative patency rate of 39.5% versus 64.9%. Comparing the results of 568 primary infrageniculate bypass procedures using SV grafting, polytetrafluoroethylene (PTFE), and PTFE-SVG, the 5-year limb salvage rate was 80% for composite grafts and 88% for SVGs. The primary and secondary patency and limb salvage rate for PTFE grafts was 24%, 31% and 40%, respectively. Arterial reconstruction of vessels of the foot and ankle using SV grafting as well as the arm vein for the management of extensive tibial and peroneal occlusive disease and patent pedal arteries showed 5.7% deaths and 4.2% graft failures within 30 days. Cumulative primary and secondary patency was 79.0% and 81.6% at 36 months, and limb salvage was 87.5% at 36 months.^{11,12}

CONCLUSION

40-years-old man came to ER after motorcycle accident, suffered pain in right forearm, numbness on fingers, and cannot move his forearm 2 hours before admitted to ER. From physical examination we found that there was loss of radial artery with missing part of artery, the saturation starting decrease. We choose perform emergency repair of artery, the situation we decided interposition graft with saphenous great vein, because from one of the research have successful rate and patency flow of artery about 86% in acute phase. The results from our worked, is fascinating and show good progress from clinical pattern.

REFERENCES

1. Fields C E, Latifi RI, Ivatury R R: Brachial and Forearm vessel Injuries: Vascular Trauma Complex and Challenging Injuries, Part II. Surg Clin of North Am 82:105 – 114, 2002.
2. Frykberg ER: Combined vascular and skeletal trauma: Vascular Trauma : Trauma Org:2005: diakses dari <http://www.trauma.org/archive/vascular/vascskeletal.html>.
3. Levy RM, Alarcon RH, Frykberg ER: Peripheral Vascular Injuries : Trauma manual, The Trauma and Acute Care Surgery, 3rd Edition. Lippincott William & Wilkins 2008.
4. Dueck AD, Kucey DS: The Management of Vascular Injuries in Extremity Trauma. Current Orthopedics 2003;17:287-291.
5. Manthey DE, Nicks BA: Penetrating Trauma to The Extremity: J Emerg Med 2008;34:187-193.
6. Management of Complex Extremity Trauma: American College of Surgeons Committee on Trauma. Ad Hoc Committee On Outcomes 2005.
7. Marrero IC, Chaudhry N :Hand, Upper Extremity Vascular injury : Treatment. Diakses dari <http://emedicine.medscape.com/article/1287360-treatment>.
8. Starnes BW, Arthurs ZM: Endovascular Management of Vascular Trauma. Perspect Vasc Surg Endovasc Ther 2006; 18:114 – 124.
9. Tiwari A, Haq AI, Myint F, Hamilton G: Acute Compartment Syndromes. Br J Surg 2002;89:397 – 412.
10. Manthey DE, Nicks BA: Penetrating Trauma to The Extremity. J Emerg Med;2008;34: 187- 193.
11. Marrero Ian C, Chaudhry Nadeem, Salhab KF: Hand, Upper Extremity Vascular Injury: diakses dari <http://emedicine.medscape.com/article/1287360-overview>.
12. Iriz Erkan, Kolbakir F, Sarac A, et al: Retrospective assesment of Vascular Injuries: 23 Years of Experience. Ann Thorac Cardiovasc Surg 2004;10: 373 – 378.