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Volume 5 | Number 3 | July-September 2017

Research Articles

Comparison between two sternum closing techniques by median sternotomy during open cardiac surgery | 44

Kenan A. Kara, Zafer Erk, Aytuğ Koçyiğit, Şenol Gülmen, Ahmet Öcal, Hüseyin Okutan

Case Report

Hybrid treatment of aortic bifurcation aneurysm | 50

Funda Yıldırım, Dilşad Amanvermez Şenarslan, Adnan Taner Kurdal, Barış Bayram, Tülün Öztürk, Mustafa Cerrahoğlu, İhsan İşkesen, Ömer Tetik

Extra-anatomic left carotico-subclavian artery bypass technique in a patient with subclavian steal syndrome: Case report | 54

Ertan Demirdaş, Kıvanç Atılgan, Zafer Cengiz Er, Ferit Çiçekçioğlu

Use of new oral anticoagulants secondary to paget–schroetter syndrome in a young sportsman: A case report | 58

Kenan A. Kara, Uğur Diliçıkık, Başar Sarıkaya, Şenol Gülmen

Endovascular treatment of a ruptured abdominal aortic aneursym in a patient with cardiogenic shock | 62

Ali Baran Budak, Atike Tekeli Kunt, Orhan Eren Günertem, Naim Boran Tümer, Kanat Özışık, Serdar Günaydın

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Comparison between two sternum closing techniques by median sternotomy during open cardiac surgery

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Abstract

Introduction: Recovery failures such as sternal dehiscence, sternal pain, sternal wound infections, osteomyelit and mediastinit can be seen after median sternotomy in coroner bypass surgery. In this study, two sternum band closure methods which we find more effective and secure than conventional sternal closure method, are compared.

Method: In this prospective study that compares two sternal band closure techniques, 114 patients are divided in two groups as Group A (n=54) and Group B (n=60). This research compares the results for sternal dehiscence, sternal wound infections, sternal pain and mediastinit in these patient groups between December 2011 and July 2012.

Results: Out of the two, a meaningful recovery is achieved in Group A compared to Group B ($p<0.05$). No superficial woud infection, sternal dehiscence and mediastinit are found in patients of both band groups.

Conclusion: In this study, two different band closure techniques for sternotomy closure after the coroner bypass surgery are compared, and it is revealed that sternal pain index decreases meaningfully, compared to the other.

Key Words: Sternal band, sternal dehissence, sternotomy, pain index

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Introduction

Median sternotomy is the most frequently used incision in patients of open cardiac surgery. Following open cardiac surgery by median sternotomy, sternum is closed by surgical steel wires as whole layer. Potential post-operative sternal instability definition is dehiscence of both sternal parts due to cutting of sternal cortical layers by sternum closing wires with inappropriate movements of patient. This may result in conditions ranging from increased postoperative pain, sternal wound infection and mediastinitis associated with higher morbidity and mortality, prolonged hospital stay and increased treatment cost.[1-4]

Sternal bands used in our study are reported to prevent cutting of sternal cortex as tension on sternum is applied on larger and more balanced area, unlike to conventional sternal steel wires.[4-6]

The aim of this study to compare two different sternal band closing methods combined by conventional sternal closing method and to report the results.

Patients and Method

In our clinic, 114 patients (60 males, 54 females; mean age 65,095 years) underwent to open cardiac surgery between December 2011 and July -2012 were prospectively reviewed. Sternal closinmg was performed by Peninsula Sterna –Band® (L.L.C. Livonia MI. USA) was used in 54 patients consisting first group (group A) and by Ethicon Sternum Band (Norderstedt, Germany) used in 60 patients consisting second group (group B).

Patients with pre-operative renal insufficiency, left ventricle dysfunction, patients receiving anticoagulants, those who have hemorrhagic disorder and those who received postoperative over two drains, were not included in the study. Preoperative demographic properties of patients are shown in Table 1.

Anesthetic medication and prophylaxis were identical in both groups. Following standard sterilization, operating area was covered by ioban 2 drape (3M Health Care, St Paul, MN, USA). Following median sternotomy, antegrade cold blood cardioplegia with intervals of

Table 1. Preoperative demographic properties.

Group	A	B	p value
Patient number	54	60	NS
Age (Years)	64.96 ± 9.88	65.23 ± 10.11	NS
Weight (kg)	75.16 ± 12.	78.1 ± 17.48	NS
Height (cm)	165.00 ± 8.4	166.45 ± 9.25	NS
BMI	27.59 ± 3.98	28.12 ± 5.35	NS
COPD	21 (% 38.9)	28 (% 46.7)	NS
DM	20 (% 37.0)	27 (% 45)	NS
Obesity (BMI > 30)	25 (% 46.3)	23 (% 38.3)	NS
Osteoporosis	3 (% 5.6)	9 (% 15)	NS
Smaller Sternum	7 (% 13)	6 (% 10)	NS

COPD: *Chronic obstructive pulmonary disease;* ***DM:*** *Diabetes mellitus;* ***BMI:*** *Body mass index;* ***NS:*** *Non-significant.*

20 minutes and continuous retrograde blood cardioplegia were used with standard cardiopulmonary bypass.

Retrosternal two sternal bands at intercostal spaces 3 and 4 and four standard 5/0 steel wires at intercostal spaces 1- 2- 5 and 6 were placed for sternal closing in Group A. In Group B, retrosternal sternal band at intercostal spaces 3 and five standard 5/0 steel wires at intercostal spaces 1- 2- 4-5 and 6 were placed. Then cutaneous and subcutaneous tissues were closed standardly. Following post-operative hemodynamic stability, all patients were ex-tubed at hour 4 to 6 and pain index scoring was obtained following mobilization during post-operative intensive unit care. Pain index was obtained by using pain scoring method Visual Analogue Scale (VAS) to evaluate the effect of both bands on post-operative pain. Patients were verbally asked to rate the presence, frequency and severity of pain on the sternum by a scale of 1 to 10. Pain index scoring was calculated by multiplying post-operative pain frequency by pain severity.

Statistical analysis was performed by SPSS 15.0 version for Windows (SPSS Inc., Chicago, Illınois, USA) software. T-Test, Pearson Chi-Square test and Mann-Whitney test were used for data analysis. Statistical data was expressed as mean ± standard deviation and significance was considered as $p < 0.05$.

The study was approved by Süleyman Demirel University Faculty of Medicine Scientific Study Projects Consulting Coordinating Board by project number B.30.2.SDU.0.20.05.07-507/5077 on 27.12.2011 and board decision no. 27/6.

Results

Pre-operative demographics were not statistically significantly different between two groups **(Table 1)**. Surgery type of operated patients is shown on **Table 2**. When peri- and post-operative variables were evaluated, there was no statistical difference in respect of cardiopulmonary bypass time (CPB), aortic cross clamp time (ACC), DR drainage amount, the amount of blood utilized, administration of inotropes, drain removal

Table 2.

	Group A	Group B
On pump CABG	45	52
Valve + CABG	3	2
Off- pump CABG	6	3

CABG: *Coronary artery bypass graft*

Table 3.

	Group A (n=54)	Group B (n= 60)	P
CPB	100.1 ±26	103.5 ± 30.2	NS
ACC	60.8 ± 10.2	63.6 ± 7.0	NS
Total drain (ml)	850 ± 330.5	800 ± 310.2	NS
Drain removal (hour)	44 ±4.1	43 ± 4.08	NS
Superficial wound infection	-	-	-
Mediastinitis	-	-	-
Dehiscence	2	1	NS
Discharge time (days)	7	7	NS
Pain index	6 (min 1- max 48)	4.00 (min.1 – max 63)	p=0.011, P <0.05

Pain index: *Pain severity x Pain frequency*

time, superficial wound infection, mediastinitis, dehiscence and discharge time ($p > 0.05$), **(Table 3)**.

Mean pain index was 6.00 (min 1 – max 48) and 4.00 (min 1 – max 63) in Group A and Group B, respectively. Statistically significant difference was found between two groups in respect of pain index ($p = 0.011$).

Discussion

Complete closing of sternum following median sternotomy during open cardiac surgery, is a critical point in prevention of postoperative complications due to sternotomy. These complications include mainly dehiscence as well as a broad range of conditions such as pain, superficial wound infection and mediastinitis. Currently several sternal closing methods were described to prevent these complications.[4] Therefore, in our study we compared two different sternal bands used for sternal closing.

In patients with sternotomy, sternal dehiscence is the most frequent complication and the rate is 0.3% to 5%. This is a mechanical problem associated with certain factors such as lack of attention of patient to protect the sternum post-operatively, COPD, obesity, osteoporosis, use of bilateral mammarian arteries, renal insufficiency, administration of steroids and re-operation.[4] The incidence of sternal wound infection is 0.4-5% and it is closely associated with dehiscence.[10]

Closing of sternum is an important factor for sternal dehiscence. During sternal closing done by conventional approach using steel wires 5/0, bone cortex erosion, fracture and consequently sternal dehiscence can occur due to compression of steel wires. Sternal dehiscence may lead to respiratory dysfunction, infection, increased pain and re-exploration.[16] Use of sternal band, especially retrosternal application at intercostal space 3 and 4 to transversely surrounding whole sternum, is the most important mechanism to reduce development of sternal dehiscence with its 6 times larger surface than steel wires and thus providing equal loading on sternum. In our study, sternal dehiscence and sternal wound infection were not detected in both groups.

Postoperative pain is an acute pain gradually reducing by tissue healing accompanied also by inflammatory process.[6] Indeed, acute pain is a complex sensation besides its simple perceptional character. Difference in pain perception may be due to central process, fear, anxiety, depression and previous experience on pain perception. Certain patients may not describe the pain due to their higher pain tolerance or their introvert pain handling methods. Difference in pain perception of patients may be also due to post-operative analgesic administration methods. However, 30% of surgery patients don't require postoperative analgesics.[7] In a prospective clinical study, localization, distribution

Figure 1.

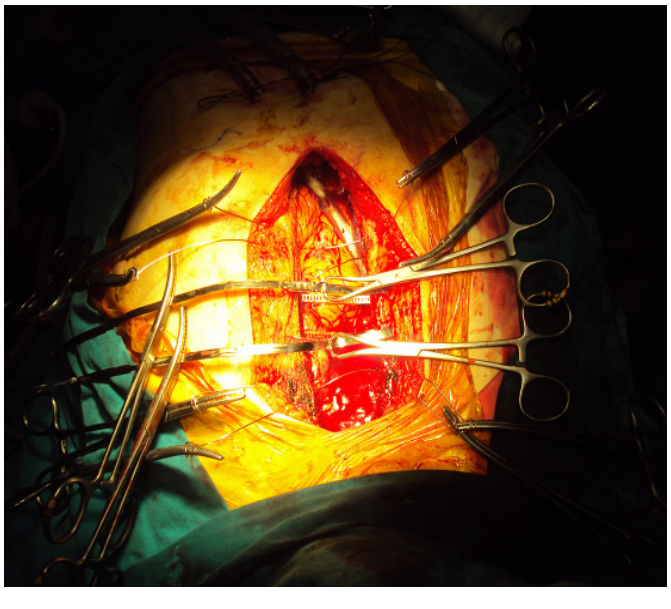
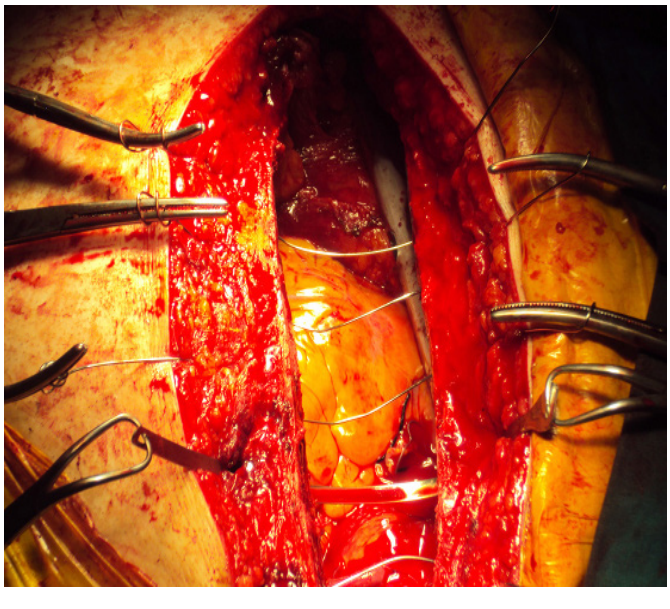
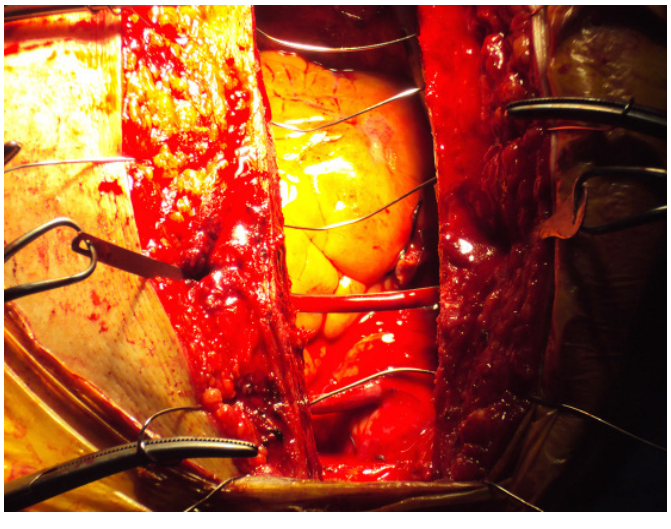


Figure 2.



and severity of postoperative pain were evaluated in consecutive 200 patients with cardiac surgery by median sternotomy.[8] Investigators determined the highest pain intensity on day 1 and lowest intensity on day 3. Although pain distribution was not different during post-operative period, there was difference in its localization.[9,15] Another factor affecting the pain severity is the age of patient. Young patients reported more severe pain than patients over 60 years.[8,11]

Figure 3.



Previous studies comparing sternal band and conventional sternal closing also showed that usage of sternal band was associated with decreased pain and this was explained by reduced development of sternal dehiscence. However, in our study, we determined a difference between different methods of sternal bands in respect of pain development. When two groups of our study were compared, there was significant reduction in post-operative pain development in Group B compared to Group A. At this point, we consider that reduced compression of band method on a smaller bone cortex area only at intercostal space 3 in Group B compared to band method of Group A, could explain lower pain.

However, we think that the limited number of studies on pain in cardiac surgery and multifactorial nature of pain are limitations of our study. Although our study is prospective and including low number of patients, we conclude that larger studies will provide more guidance by including psychological and anatomic-physical parameters such as difference in physical load on bone structure by the material utilized.

References

1. A.Rahman,O Burma.The effect of coronary artery bypass grafting with Cardiopulmonary bypass and beating heart technique on cardiac performance Turkish J Thorac Cardiovasc Surg 2001;9:68-73
2. H.Ekin,V.Kutay Tek ve İki Damar Hastalarında Çalışan Kalpte ve Kardiyopulmoner Bypass ile Yapılan Myokardiyal Revaskülarizasyonların Karşılaştırılması Van Tıp Dergisi: 2004;11 (3):92-97
3. Cameron A, Davis KB, Green G, Schaff HV. Coronary bypass surgery with internal-thoracic-artery grafts-effects on survival over a 15-year period.N Engl J Med 1996;334:216-9.
4. Friedrich-Christian Riess,1 Nizar Awwad,1 Bettina Hoffmann. A Steel Band in Addition to 8 Wire Cerclages Reduces the Risk of Sternal Dehiscence after Median Sternotomy. The Heart Surgery Forum 7 (6), 2004 [Epub September 2004]
5. Wewers ME, Lowe NK. A critical review of visual analogue scales in the measurement of clinical phenomena. Research in Nursing & Health 1990;13: 227-236,
6. Uyar M. Postoperatif ağrılı hastanın değerlendirilmesi ve ağrı ölçümü. Yücel A ed. Postoperatif analjezi 1. basım. İstanbul: Mavimer Matbacılık Yayıncılık Ltd. Şti. 2004; 27-36.
7. Rawal N. Postoperatif Ağrının Psikolojik Etkileri Editör: Erdine S. Ağrı. Nobel Tıp Kitabevleri 1.baskı. 2000; 124-125.
8. Mueller XM, Tinguely F, Tevaearai HT ve ark. Pain location, distribution and intensity after cardiac surgery. Chest 2000; 118: 391-6.
9. Moore R, Follette DM, Berkoff HA. Poststernotomy fractures and pain management in open cardiac surgery. Chest 1994; 106: 1339-42.
10. Blanchard A, Hurni M, Ruchat P, et al: Incidence of deep and superficial sternal infection after open heart surgery: A ten years retrospective study from 1981 to 1991. Eur J Cardiothorac Surg 1995; 9: 153-8.
11. Farinas MC, Peralta FG, Bernal JM, et al: Supurative mediastinitis after open heart surgery: A case-control study covering a seven year period in Santander, Spain. Clin Infect Dis 1995; 20: 272-6.
12. He GW, Ryan WH, Acuff TE, et al: Risk factors for operative mortality and sternal wound infection in bilateral internal mammary artery grafting. J Thorac Cardiovasc Surg 1994; 107: 196-9.
13. Kluytmans JAJW, Mouton JW, Ijzermann EPF, et al: Nasal carriage of staphylococcus aureus as a major risk factor for wound infections after cardiac surgery. J Infect Disc 1995; 171: 216-9.
14. Jurkiewicz MJ, Bostwick J, Hester TR, Bishop JB, Craver J. Infected median sternotomy wound. Ann. Surg. 1980; 191(6):738-43.
15. Catarino PA, Chamberlain MH, Wright NC, Black E. High-Pressure suction drainage via a polyurethane foam in the management of poststernotomy mediastinitis. Ann. Thorac Surg. 2000; 70: 1891-5.
16. Robiscek F, Fokin A, Cook J, Bhatia D. Sternal Instability After Midline Sternotomy. Thorac Cardiov Surg. 2000; 48 (4): 1-8.

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Hybrid treatment of aortic bifurcation aneurysm

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Abstract

The success of endovascular treatments mostly depends on anatomical suitability. Secure neck and iliac landing zones are required to avoid of endoleaks. Common iliac artery aneurysms frequently extend to the iliac bifurcation and complicates endovascular interventions. We report a hybrid operation of an abdominal bifurcation and extremely angulated iliac artery aneurysm that aneurysmatic segments involving both internal iliac arteries (IAA). We excluded the aneurysm by an uniiliac endovascular stent graft and contralateral IIA flow was supplied by retrograde filling from femoro-femoral bypass after ligation contralateral common iliac artery via retroperitoneal approach. It is important to consider alternative treatment modalities and in cases with extreme anatomic variations, to choose a hybrid endovascular approach may be the most feasible and less invasive.

Keywords: Endovascular treatments, hybrid operation, abdominal bifurcation, iliac artery aneurysm.

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Introduction

Infrarenal abdominal aortic aneurysm and iliac artery aneurysm are seen mostly together. The success of endovascular treatments mostly depends on anatomical suitability. Secure neck and iliac landing zones are required to avoid of endoleaks. Common iliac artery aneurysms (CIA) frequently extend to the iliac bifurcation and complicate the endovascular interventions. The preservation of circulation of at least one internal iliac artery (IIA) is highly recommended.

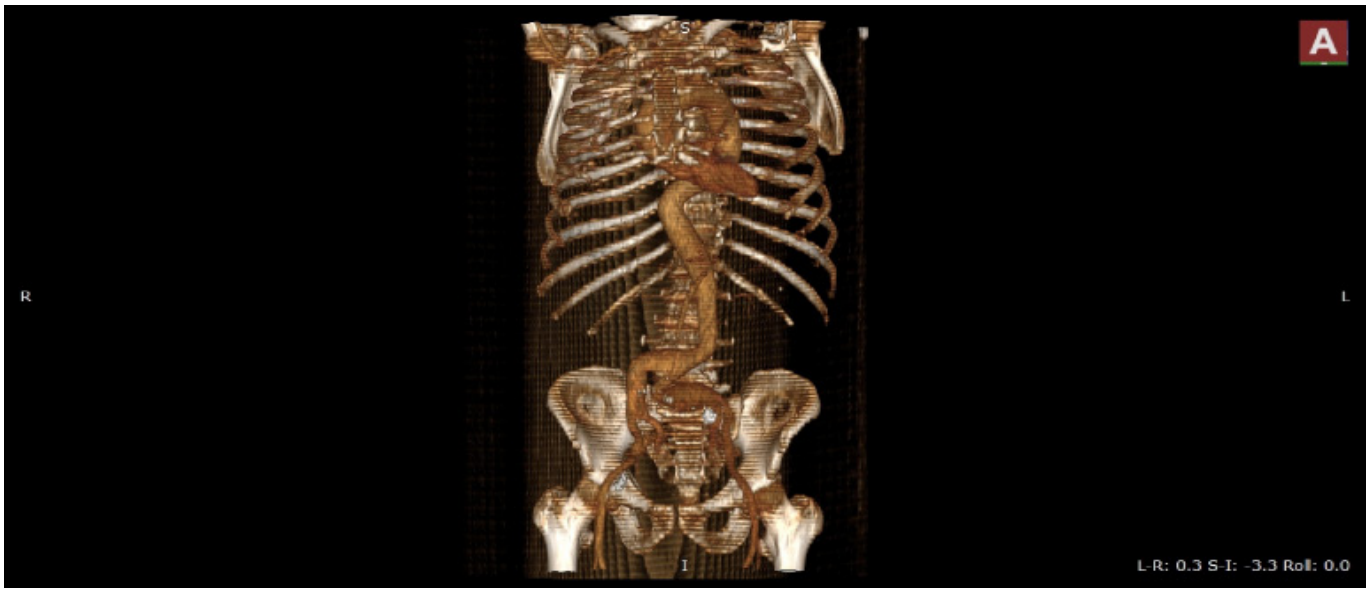
Case

We report a hybrid operation of an abdominal bifurcation and extremely angulated iliac artery aneurysm that aneurysmatic segments involves both internal iliac arteries. A-71year old man was diagnosed incidentally aortoiliac aneurysm by routine urologic examination and referred to our clinic **(Figure 1)**. We planned hybrid approach. Both common femoral arteries were explored and snared. The aneurysm is excluded by a aorto-uniiliac endovascular stent graft system (Endurant II, MedtronicTM) that extending to the right external iliac artery (EIA) and right IIA is closed with the extension graft. A femoro-femoral bypass is made with 8 mm ringed PTFE graft to supply left lower extremity circulation **(Figure 2, 3)**. Then we explored the left common aneurysmatic iliac artery by retroperitoneal approach with lateral oblique abdominal incision. We ligated the CIA with nylon tape to prevent the enlargement of aneurysmal sac of the left CIA. The flow to the left IIA was supplied by retrograde filling from femoro-femoral bypass. Then we observed the decreased tension of the aneurysmal sac in left CIA also the left IIA pulse was palpated. No proximal, distal, or graft junction endoleaks occurred. The patient was discharged without trouble at postoperative fourth day.

Discussion

EVAR has become the firstline choice in abdominal aortic aneurysm repair. But there are some limitations to its use; hostile neck anatomy, hostile iliac anatomy (HIA) and aneurysmal enlargement involving bilateral internal iliac artery. Approximately 30% of patients treated by EVAR have ectatic or aneurysmal common iliac arteries not suitable for distal sealing zones. Bilateral internal iliac artery occlusion during endovascular repair may lead significant morbidity, including gluteal claudication, erectile dysfunction, ischemia of the sigmoid colon and perineum and spinal cord injury.[1,2,3]

Figure 1. ***Computed tomography angiography 3 dimentional reconstruction view, aortic aneurysm just prior to aortic bifurcation and extending to common iliac artery. Aneurysmatinc segment involves bilateral internal iliac artery and hostile iliac arteries.***



In CIA aneurysms involving the IIA, there are some ways of preserving flow to IIA; Surgical revascularization of IIA via retroperitoneal or retroinguinal insicion. An uncovered stent can extend the sealing zones, whilst maintaining complete preservation of pelvic circulation and offers support to the covered stent-graft.[4] Iliac side-branched graft (IBG) or sandwich technique can maintain pelvic perfusion. However, these adjunctive procedures increase the risk of endoleaks and they need to be applied by an experienced interventionist because of its technical difficulties.[5-8]

The presence of narrow iliac arteries (diameter <7 mm), hemodynamic iliac stenosis or obstruction, severe or extensive calcifications (>50%iliac circumferential calcification), angulations (>90 degree), previous aortailiac/femoral graft was defined as HIA.[5] HIA or previous surgical or endovascular graft greatly limits the endograft's maneuverability.[9]

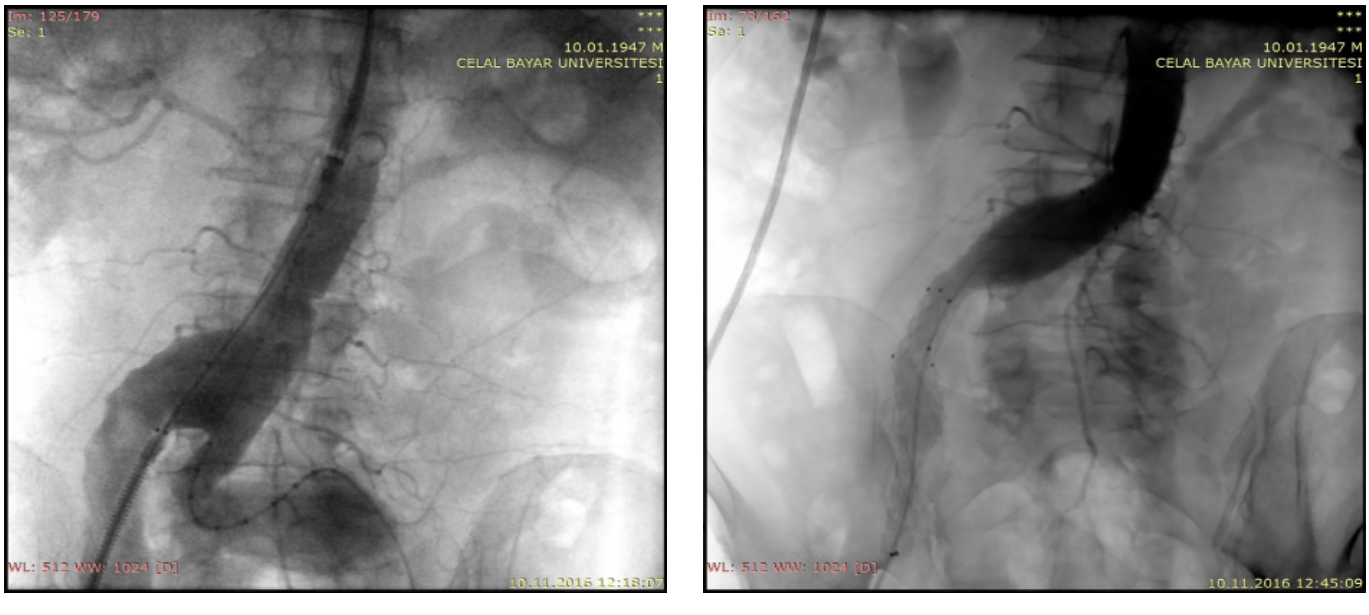
This case have an aortic aneurysm just prior to aortic bifurcation and extending to CIA. The case is an example to hostile iliac artery because of severe iliac angulation and also it is complicated by aneurysmatic segment involving bilateral IIA ostium. The aneurysm is treated in combined fasion: endovascular and convential surgery. We used this approach for two reasons. First, to prevent recurrent king or stenosis of the left iliac endograft system due to extreme angulation to the right side. Secondly, to preserve the blood supply of at least one of the internal iliac artery.

We think that it is important to consider alternative treatment modalities and in cases with extreme anatomic variations, to choose a hybrid endovascular approach may be the most feasible and less invasive.

Conclusion

Despite progress in endovascular therapy, large infrarenalble to use combined thoracic and abdominal stent graft as an alternative treatment modality when the patient is not suitable for standard EVAR and open surgery.

Figure 2, 3. Insertion of uniiliac stent graft system.



References

1. Faries PL, Morrissey N, Burks JA, Gravereaux E, Kerstein MD, Teodorescu VJ et al. Internal iliac artery revascularization as an adjunct to endovascular repair of aortoiliac aneurysms. J Vasc Surg 2001; 34(5): 892-9.
2. Cochennec F, Marzelle J, Allaire E, Desgranges P, Becquemin JP. Open vs endovascular repair of abdominal aortic aneurysm involving the iliac bifurcation. J Vasc Surg 2010; 51(6): 1360-6.
3. Bosanquet DC, Wilcox C, Whitehurst L, Cox A, Williams IM, Twine CP; British Society of Endovascular therapy (BSET). Systematic Review and Meta-analysis of the Effect of Internal Iliac Artery Exclusion for Patients Undergoing EVAR. Eur J Vasc Endovasc Surg 2017; 53(4): 534-548.
4. Silingardi R, Tasselli S, Gennai S, Saitta G, Coppi G. Endovascular preservation of pelvic circulation with external iliac-to-internal iliac artery "cross-stenting" in patients with aorto-iliac aneurysms: a case report and literature review. J Cardiovasc Surg (Torino) 2012; 53(5): 651-5.
5. Zeng Q, Huang L, Huang X, Peng M. Endovascular repair of abdominal aortic aneurysm with severely angulated neck and tortuous artery access: case report and literature review. BMC Surg 2015; 15: 20.
6. Noel-Lamy M, Jaskolka J, Lindsay TF, Oreopoulos GD, Tan KT. Internal Iliac Aneurysm Repair Outcomes Using a Modification of the Iliac Branch Graft. Eur J Vasc Endovasc Surg 2015; 50(4): 474-9.
7. Lim CS, Naji Y, Hussain ST, Pleban E, Wiszniewski A, Onida S et al. Modified Sandwich-graft Technique Employing Aorfix and Viabahn Stent-grafts to Preserve Hypogastric Flow in Cases of Complex Aortoiliac and Isolated Common Iliac Artery Aneurysms Including the Internal Iliac Artery Ostium. Eur J Vasc Endovasc Surg 2016; 51(3): 364-70.
8. Donas KP, Torsello G, Pitoulias GA, Austermann M, Papadimitriou DK. Surgical versus endovascular repair by iliac branch device of aneurysms involving the iliac bifurcation. J Vasc Surg 2011; 53(5): 1223-9.
9. Gallitto E, Gargiulo M, Faggioli G, Pini R, Mascoli C, Freyrie A et al. Impact of iliac artery anatomy on the outcome of fenestrated and branched endovascular aortic repair. J Vasc Surg. 2017; 6. pii: S0741-5214(17)31359-9. doi: 10.1016/j.jvs.2017.04.063. [Epub ahead of print] PubMed PMID: 28888759.

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Extra-anatomic left carotico-subclavian artery bypass technique in a patient with subclavian steal syndrome: Case report

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Abstract

Subclavian steal syndrome (SSS) is characterized by total occlusion of proximal part of subclavian artery resulting with retrograde flow of vertebral artery. The main risk factors in etiology are hypercholesterolemia and atherosclerosis. Congenital left subclavian artery stenosis and patent ductus arteriosus accompanying aortic coarctation, posttraumatic injuries, thromboembolism and arteritis are some of the rare factors causing SSS. SSS is usually an asymptomatic disease. However, the major symptoms are dizziness, claudication intermittent of upper extremity, headache and paresthesia in distal part of upper extremities. We are presenting a 57-year-old man presenting with a claudication intermittent on the left arm, paresthaesia in fingers, dizziness and headache for a three year time. After applying a computerized tomographic angiography, we observed that the left subclavian artery was totally occluded at the origin point. There are several surgical approaches for the treatment of this syndrome. In this case, we preferred the carotico-subclavian bypass technique with supraclavicular approach due to its low rates of mortality and morbidity, and high rates of long term durability.

Key words: Graft, carotid artery, subclavian steal, supraclavicular

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Introduction

Subclavian steal syndrome (SSS) is usually an asymptomatic disease characterized by total occlusion etiology of proximal part of subclavian artery.[1] SSS was first described in the early 20th century and many of researches have been made both in diagnosing and treating areas. It is well known that SSS is a consequence of retrograde flow of vertebral artery following the total occlusion of proximal part of subclavian artery.[2] The main risk factors in etiology are hypercholesterolemia and atherosclerosis.[2-4] It is also possible to observe SSS due to congenital left subclavian artery stenosis and patent ductus arteriosus accompanying aortic coarctation.[5,6] Besides, posttraumatic injuries, thromboembolism and arteritis are some of the rare factors causing SSS.[1-3]

SSS is usually an asymptomatic disease. However, the major symptoms are dizziness, claudication intermittent of upper extremity, headache and paresthesia in distal part of upper extremities. SSS is often diagnosed incidentally by means of observing the retrograde flow of vertebral artery in colored doppler ultrasonography of carotid and vertebrobasillary arteries getting applied to the patients having dizziness and observing a gradient in tension arterial (TA) pressures between two upper extremities.

Case Report

A 57-year-old male with a history of claudication intermittent on left arm, paresthesia in dita, disseness and headache for three years applied to our department. Distal pulses were not palpable on the left upper extremity and TA was 130/80 mmHg on right arm and 60/30 mmHg on left arm. On the computerized tomographic angiography (CTA), we observed that the first 3 cm part of the subclavian artery begining from the aortic arcus origin was totally occluded.**(Image 1)**

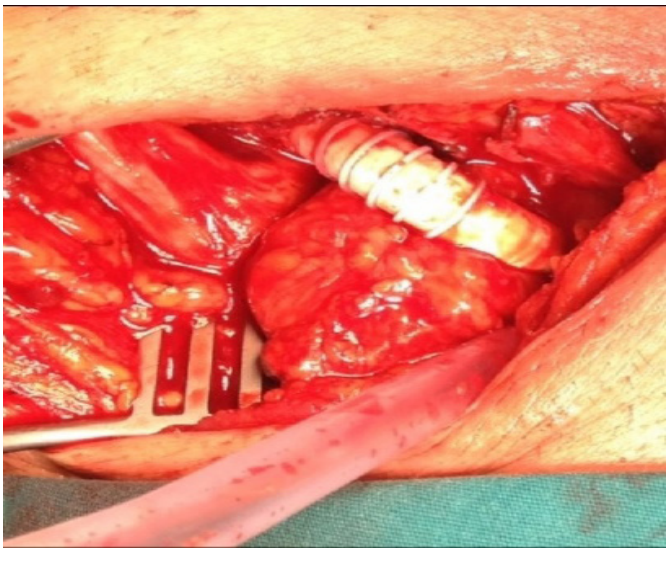
Operation Technique

Invasive arterial monitorization was applied from right upper extremity. The patient was positioned as the head in hyperextension and the face looking to the opposite side, left shoulder was elevated and the upper extremities were pulled down. An 8 cm left supraclavicular incision was applied, common carotid and subclavian arteries were dissected gently and the proximal and distal parts were fixed with tapes. After systemic heparinization common carotid artery was clamped. Following arteriotomy the proximal segment of an 8 mm PTFE graft was anastomosed to the artery. After declamping, subclavian artery was clamped and arteriotomy was applied. Distal segment of PTFE graft was anastomosed to the subclavian artery.**(Image 2)** After

Image 1. Preoperative Computerized Tomographic Angiography image



Image 2. Intraoperative image of the graft



the operation on both sides of upper extremities distal pulses were palpable. The patient was discharged on the postoperative 6th day without any complication.

Discussion

Subclavian steal syndrome (SSS) is characterized by total occlusion of proximal part of subclavian artery resulting with retrograde flow of vertebral artery. The retrograde vertebral artery flow may cause variable symptoms like cerebellar ischaemia (dizziness, blumia), cladication intermittent and paresthaesia on the upper extremity.

There are different types of surgical techniques, almost all of which get a remarkable success in eliminating the symptoms, and surgery should be a treatment approach only in symptomatic patients. The first successful transtorasic intervention for a subclavian artery obstruction was achieved by De Bakey et al in 1958. [7] In 1964 Parrot described the carotico-subclavian artery bypass procedure.[8] Carotico-subclavian bypass, subclavio-subclavian bypass, axillo-subclavian bypass and subclavio-carotid transposition techniques are described as extra-anatomic procedures, and aorta-subclavian bypass and endarterectomy are descired as anatomic procedures. Transthoracic incision techniques are not preferred anymore due to high mortality and morbidity rates.[9]

Percutaneous transluminal angioplasty and stenting (PTAS) are some of the treatment approaches as an alternative to surgery. Especially PTAS have become the first option in SSS cases occuring as a result of vasculitis or radiotherapy.[10] However, the long term durability of surgery is superior to PTAS.[11]

Carotico-subclavian artery bypass technique is an extra-anatomic bypass process and has a low morbidity and mortality rates. Vogt et al, reported the mortality rate of intrathoracic techniques as 15% and of extra-anatomic techniques as 0%, in 1982.[12] Saphenous and artificial grafts can be used for bypassing. However, 5 year durability rates are reported as 95,2% for PTFE grafts, 83,9% for Dacron grafts and 64% for saphenous vein grafts.[13] In our case we preferred an 8 mm PTFE graft.

In recent researches, carotico-subclavian artery bypass technique is described as a process having low mortality and morbidity, and long term survival rates. [14,15] Normal carotid artery anatomy is a necessity for this technique, otherwise it is possible to cause a carotid artery steal syndrome.[16-18]

Conclusion

Extra-anatomic carotico-subclavian artery bypass technique is a relatively easy process in comparison to other techniques, and has better mortality and morbidity rates , because of that we prefer and recommend this technique as a first option for patients having SSS.

References

1. Potter BJ, Pinto DS. Subclavian steal syndrome. Circulation, 2014 jun 3; 129(22):2320-3
2. Abova V,Kamineni A, Allison Ma,Mc Dermott MM,Crouse JR, Ni h,Szklo et al. The epidemiology of subclavian stenosis and its association with markers of subclinical atherosclerosis: The Multi-Etnic study of atherosclerosis (MESA). Atherosclerosis. 2010;211:266–70.
3. Labropoulos N, Nandivada P, Bekelis K. Prevalence and impact of the subclavian steal syndrome. Ann Surg. 2010;252:166–70.
4. Harper C, Cardullo PA, Weyman AK, Patterson RB Transcranial Doppler ultrasonography of the basilar artery in patients with retrograde vertebral artery flow. J Vasc Surg. 2008;48:859–64.
5. Gerber N. Congenital atresia of the subclavian artery producing an subclavian steal syndrome. Amer j dis child 1967;113:709-13.
6. Daves j,Treger A. Vertebral grand larcency. Circulation 1964;29:91-3.
7. DeBakey ME, Morris GC, Jordan GL, Cooley DA. Segmental thromboobliterative disease of branches of aortic arch. JAMA 1958;166:988-1003.
8. Parrot JD. The subclavian steal sendrome. Arch Surg 1964;88:661-5.
9. Fields WS, Lemak HA. Joint study of extracranial Arterial Occlusion, VII.Subclavian steal - a review of 168 cases. JAMA 1972;222:1139-43.
10. Kim HJ, Lee CS, Kim JS, Know SU, Kim JL, Park JW, et al. Outcomes after endovascular treatment of symptomatic patients with Takayasu's arteritis. Interv Neuroradiol 2011;17:252-60.
11. Tetik Ö, YAŞA H, Demir T, Gürbüz A. Subklavyan Steal sendromu: 3 olgu nedeniyle. İzmir Atatürk Eğitim ve araştırma Hastanesi Tıp dergisi 2004;139-41
12. Vogt DP, Hertzer NR, O'Hara PJ, Beven EG. Brachiocephalic arterial reconstruction. Ann surg. 1982;196:541-52.
13. Law MM, Colburn MD, Moore WS, Quinones-Baldrich WJ, Machleder HI, Gelabert HA. Carotid-subclavian bypass for brachiocephalic occlusive disease. Stroke 1995;26:1565-71.
14. Aburahma AF, Robinson PA, Jennings TG. Carotidsubclavian bypass grafting with polytetrafluoroethylene grafts for syptomatic subclavian artery stenosis or occlusion: A 20-year experience. J vasc surg 2000;32:411-9.
15. Vitti MJ, Thompson BW, Read RC, et al. Carotidsubclavian bypass: A twenty–two year experience. J Vasc surg 1994;20:411-8.
16. Lord RS, Ehrenfeld WK. Carotid-subclavian bypass: A hemodynamic study. Surgery 1969;66:521-6.
17. Cook CH, Stemmer EA, Connolly JE. Effect of peripheral resistance on carotid blood flow after Carotid-subclavian bypass. Arch surg 1972;105:9-13.
18. Swayngim DM Jr, Avellone JC. Hemodynamic consequences of axillo-axillary bypass J cardiovasc surg 1982;23:65-8.

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Use of new oral anticoagulants secondary to Paget–Schroetter syndrome in a young sportsman: A case report

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Introduction

Introduction: The Paget–Schroetter syndrome or "effort thrombosis" is a deep venous thrombosis of subclavian-axillar vein at the costoclavicular junction . It affects predominately young and athletic people with an inherent anatomic variant at the costoclavicular junction that triggers the formation of a primary thrombosis. It is important to identify this syn-drome in order to prevent further complications, such as post-thrombotic syndrome, pulmonary embolism (PE), or even death. We present a clinical case in which a young professional basketball player developed a subclavian venous thrombosis and was managed with new oral anticoagulant.

Keyword: Oral anticoagulants, effort thrombosis, Paget–Schroetter syndrome, sportsman

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Case Report

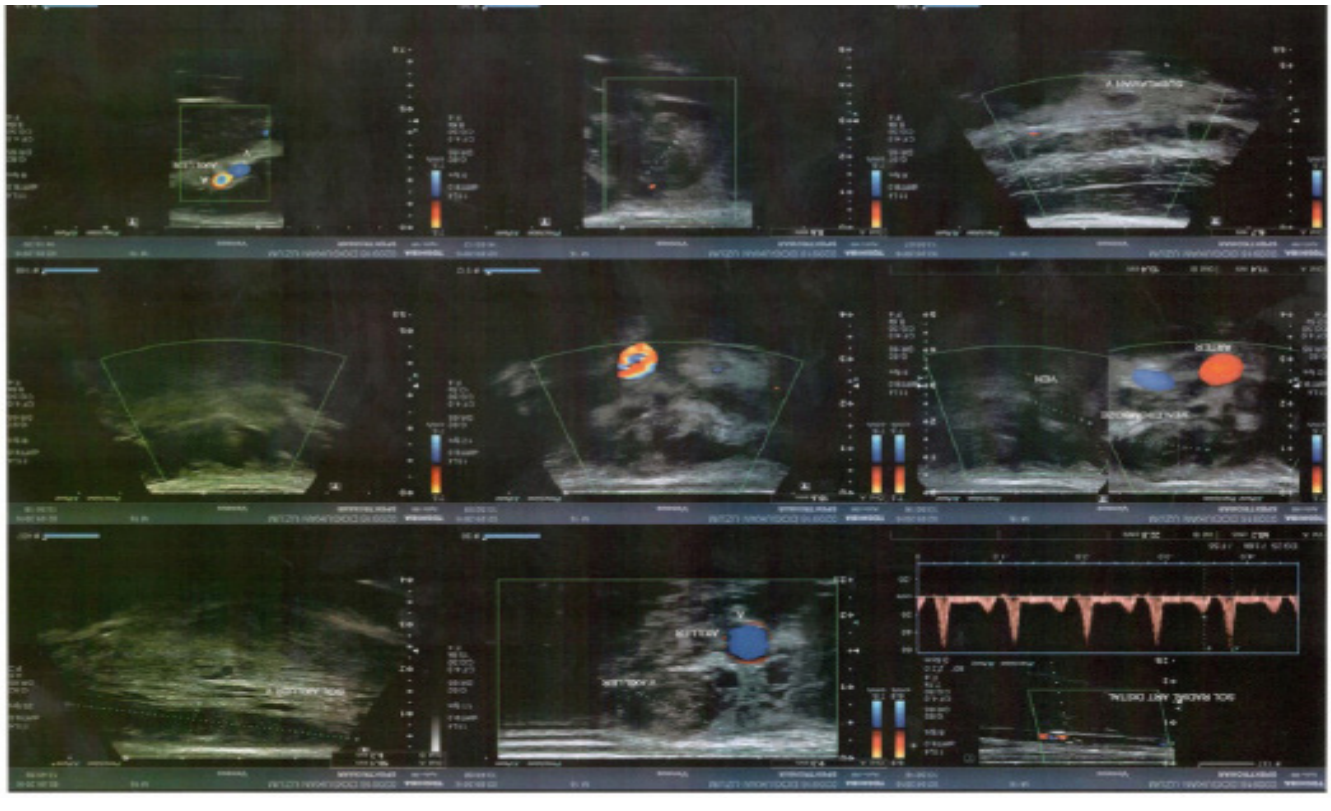
We describe a case of a 17-year-old male, Turkish basketball player, who presented to the clinic with one-week course of left upper limb pain with swelling and mild erythema. There was no previous history of chest trauma and patient denied having fever. The patient had no known medical problems, no medications and no prior family history of hematologic-related diseases. On physical examination his blood pressure was 116/88 mmHg, pulse rate 88/min, pulse oximetry showed 94% on room air, temperature was 36.4°C. His lungs were clear on auscultation and his heart sounds were normal. Edema, tenderness and erythema were found over the left upper extremity, peripheral arterial pulses were clear with palpation and no motor or sensitive deficit was present. The patient had also Urschel's sign, characterized by the dilation of veins that can be visible across the shoulder and upper arm.[1, 2]

An upper extremity venous Doppler ultrasound study was performed which confirmed the presence of a par-tially occlusive deep vein thrombosis in the left subclavian vein. HematologyInvestigations, including complete blood count, coagulation studies, and renal function tests, yielded normal results. Work-up for thrombophilic disorders includ-ed homocysteine, protein C, antithrombin III, and anti-cardiolipin antibody levels which were all within the normal range. In the ED, the patient was then placed on Pradaxa (dabigatran) 150mg orally daily

Discussion

Primary axillary-subclavian vein thrombosis, first described by Paget in 1875 and Schroetter in 1884, was named Paget-Schroetter syndrome (PSS) by Hughes in 1948.[7] Upper extremity effort thrombosis accounts for approximately1–4% of all episodes of venous thrombosis.[2] PSS most often develops among young adults who work in occupations that require repeated arm movements which cause axillo-subclavian vein trauma and facilitate the development of deep vein thrombosis (DVT).[8] Several sporting activities have been associated with axillary vein thrombosis, including ball games, racket games, and aquatic sports. Due to repeti-

Figure 1.



tive extension and hyperabduction movements of the upper limb, this kind of thrombosis is known as effort thrombosis.[9] Hematologic, anatomic, and iatrogenic predisposing factors such as thrombophilia, thorasic outlet syndrome (TOS), and major vein catheterisation are typically underlying conditions.[10-13] Clinical features of PSS include sudden onset of pain, swelling, edema, and cyanosis of the upper limb. Collateral veins are evident around the shoulder and chest. The pain increases with exercise and decreases with rest and elevation of the affected extremity.[14]

Two theories explain the initial process that generates the final event of thrombosis in the Paget-Schroetter syndrome. The first one has been involved in a frequent activity of the arm followed by the development of a hypertrophy in the anterior scalene muscle; this, leading to blood stasis and clot formation.

Secondly, several descriptions suggest that secondary thrombosis begins with a structural compression (abnormalities in the thoracic outlet), which triggers a con-tinuous process of fibrosis and scaring in the external environment surrounding the subclavian vein, of an exchange of the collagen fibers from loose connective tissue to a dense collagen scar. These perpetuate the process of stasis and thrombosis.[3]

The typical clinical presentation is a sudden onset pain, heaviness, blue-red discoloration and swelling of the upper affected arm. However, due to the mainly presentation in young athletic patients, the syndrome tends to be asymptomatic, or described by the patient as a simple muscular strain. In patients with intermittent obstruction, the symptoms will appear and disappear according to the process of obstruction. Occasionally, patients present the "Urschel's sign", characterized by the dilation of veins that can be visible across the shoulder and upper arm.[2]

The mainstream treatment of upper extremity thrombosis is based on the correction of the underlying defect and pre-vents future episodes. Currently, the gold standard in the management of this unusual thrombosis is the thrombolytic therapy. Catheter-directed thrombolysis has reported a successful of 62–82%, being higher in recent fresh clots (symp-toms <2–6 weeks) followed by a venoplasty if there is evidence of residual obstruction.[2,4] Anticoagulation therapy reduces the overall mortality and morbidity associated with this syndrome. However, some studies demonstrate an increased risk of residual venous obstruction in 78% of cases managed only with anticoagulation.[4] Urschel et al. describes that only 29% of patients treated with anticoagulation reported a good or excellent outcome.[5] There was no evidence related to the use of new oral anticoagulants for the management of upper limb thrombosis.

In cases of external compression by scaring and fibrosis the treatment needs a surgical decompression to avoid a subsequently rethrombosis.[6] The surgical procedure should be performing 1 or 2 month after the episode.

Conclusion

In conclusion, early diagnosis and treatment of the Paget–Schroetter syndrome is critical for preventing potentially fatal complications such as pulmonary embolism. Prophylaxis is important for preventing recurrent thrombosis and for avoiding development of post-thrombotic syndrome. Paget–Schroetter syndrome should be considered a possible cause of painful swelling of the upper limb, especially significant edema, blue discoloration, and dilatation of the superficial veins in the patient's right upper limb in young, active patients who use their arms excessively.

In addition, there are few studies related with the use of new oral anticoagulants for medical management. In this case report, we use one of the new oral anticoagulants. Further clinical trials are needed to show the clinical benefits of this drug and prove an association.

References

1. Illig KA, Doyle AJ. A comprehensive review of Paget-Schroetter syndrome. J Vasc Surg 2010 Jun;51(6):1538–47.
2. Alla VM, Natarajan N, Kaushik M, Warrier R, Nair CK. Paget-schroetter syndrome: review of pathogenesis and treatment of effort thrombosis. West J Emerg Med 2010 Sep;11(4):358–62.
3. Zell L, Kindermann W, Marschall F, Scheffler P, Gross J, Buchter A. Paget-Schroetter syndrome in sports activities--case study and literature review. Angiology 2001 May;52(5):337–42.
4. Adams JT, DeWeese JA. "Effort" thrombosis of the axillary and subclavian veins. J Trauma 1971 Nov;11(11):923–30.
5. Urschel HC Jr, Razzuk MA. Paget-Schroetter syndrome: what is the best management? Ann Thorac Surg 2000 Jun;69(6):1663–8; discussion 1668–9.
6. Beygui RE, Olcott C 4th, Dalman RL. Subclavian vein thrombosis: outcome analysis based on etiology and modality of treatment. Ann Vasc Surg 1997 May;11(3):247–55.
7. Oktar GL, Ergul EG: Paget-Schroetter syndrome. Hong Kong Med J, 2007,13: 243–245.
8. Ilhan E, Ture M, Yilmaz C, et al.: Subclavian vein thrombosis extending into the internal jugular vein: Paget-von Schroetter Syndrome. J Clin Med Res, 2009, 1: 178–180.
9. Maharaj D, Ramdass M, Perry A, et al.: Paget von Schroetter Syndrome secondary to exotic dancing: a case study. Int J Angiol, 2003, 12: 143–144.
10. Akita K, Ibukuro K, Yamaguchi K, et al.: The subclavius posticus muscle: a factor in arterial, venous or brachial plexus compression? Surg Radiol Anat, 2000, 22: 111–115.
11. Ozçakar L, Kaymak B, Turan S, et al.: Thoracic outlet syndrome, Paget-Schroetter syndrome and aberrant subclavian artery in a young man. Joint Bone Spine, 2006, 73: 469–471.
12. Ozçakar L, Dönmez G, Yörübulut M, et al.: Paget-Schroetter syndrome forerunning the diagnoses of thoracic outlet syndrome and thrombophilia. Clin Appl Thromb Hemost, 2010, 16: 351–355.
13. Lewandowski A, Syska-Sumińska J, Dłużniewski M: [Pulmonary embolism suspicion in a young female patient with the Paget-von Schrötter syndrome]. Kardiol Pol, 2008, 66: 969–971.
14. Bolcal C, Oz K, Sirin G, et al.: Paget-von Schroetter Syndrome associated with thrombophilia. Turk J Thorac Car-diovasc Surg, 2007, 15: 304–306.

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Endovascular treatment of a ruptured abdominal aortic aneursym in a patient with cardiogenic shock

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Abstract

Abdominal aort aneurysm is an asymptomatic and potentially lethal disease which its rupture is an emergent situation. In many centers, patients presenting with ruptured abdominal aortic aneurysm (rAAA) are most often treated with open repair(OR). A 55-year-old male with acute abdominal pain admitted to our hospital. Computed tomography scan showed a rAAA. A sudden cardiac arrest occured. The patient immediately transferred to catheter laboratory with cardiogenic shock table and endovascular treatment was performed. Then he was discharged in the postoperative 7th day.

Keyword: ruptured abdominal aort aneursym, endovascular repair, cardiogenic shock

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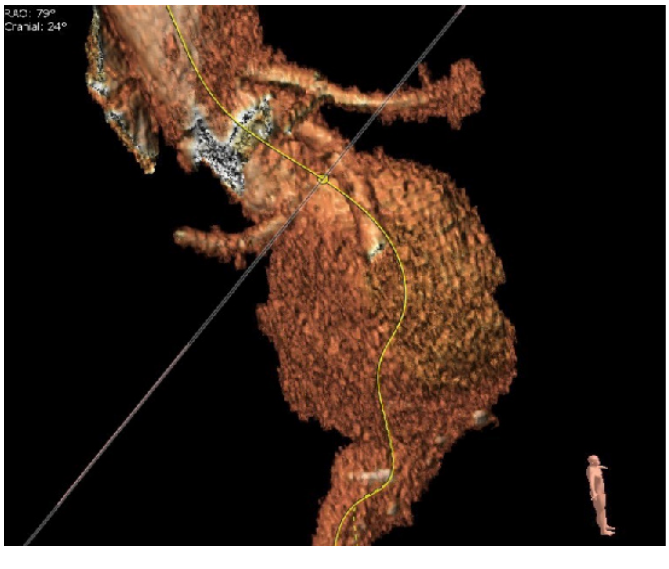
Introduction

Abdominal aort aneurysm is an asymptomatic and potentially lethal disease which its rupture is an emergent situation and has a fatality rate of 100% if untreated. Misdiagnosis causes delays for the treatment and it can be catastrophic. Depending on the patient's status during admission, the mortality ranges from 20% to 70% even in treated patients.[1,2] In many centers, patients presenting with ruptured abdominal aortic aneurysm (rAAA) are most often treated with open repair(OR). But in centers whom have a hybrid operating room as the surgeons' comfort and confidence with the technique increases, ruptured endovascular aneurysm repair (rEVAR) has become the preferred treatment option. Furthermore, patients with rAAA who are transferred for a higher level of care have superior clinical outcomes when treated with rEVAR, compared with OR.[3] Herein, we aimed to demonstrate the feasibility of emergent rEVAR in a patient with cardiogenic shock who underwent succesful resuscitations after three times caridac arrest.

Case Report

A 55-year-old male with acute abdominal pain was transferred to our emergency department and took under evaluation of general surgery and urology clinics with suspicious of renal colic and ileus. At the presentation, serum urea level was 80 mg/dl, creatinin level was 2.97 mg/dl and hemoglobin level was 7.5 g/dl. Computed tomography scan showed a rAAA extending from the caudal of superior mesenteric artery (SMA) to aortic bifurcation with a diameter of 8.53 cm. The aneurysmal sac included the right renal artery, but left renal artery could not be demonstrated **(Figure 1)**. The measurements of the aneurysm is shown in **Table 1**. The level of the rupture is shown in **Figure 2**.

Figure 1. 3D CT Image. Aneurysm extends from the distal of SMA and includes the renal arteries



After computed tomographic assessment, a sudden cardiac arrest occured. The patient was entubated and an immediate resuscitation procedure was performed. Systolic blood pressure could be increased to 40 mmHg and caridac arrest repeated for 3 times. After the systolic blood pressure was secured around 50 mmHg, the patient immediately transferred to catheter laboratory for endovascular repair. Bilateral surgical cutdown to the groin was performed. after positioning a 20 F sheat

Table 1. The measurements of the aneurysm.

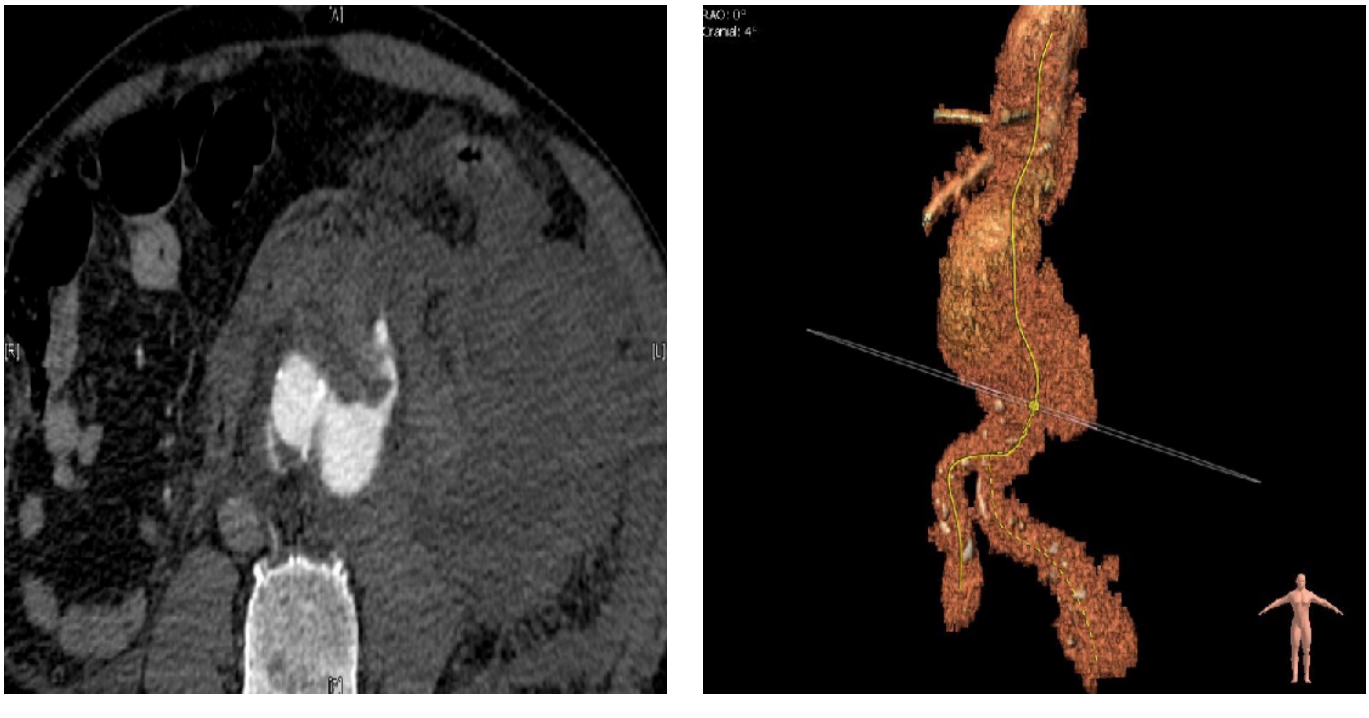
Measured Area	Milimeter
Proximal diameter of neck	30.3
Distal diameter of neck	28
Neck length	12
Max aneurysm diameter	85.3
Distal aorta diameter	22.5
SMA to distal aorta	142.4
Proximal diameter of RCI	13
Diameter of RCI	14.5
Distal diameter of RCI	18.2
Length of RCI	73.2
Total length from right (SMA to right internal iliac artery)	215.7
Proximal diameter of LCI	12
LCI diameter	13.5
Distal diameter of LCI	16.9
Length of LCI	76.8
Total length from left (Infra renal level to left internal iliac artery	219.2

to left CFA (Sentrant Sheath, Medtronic), a uniiliac stent graft sized 32x14x102 mm was positioned (Endurant® II uniiliac, Medtronic). SMA was preserved. After succesful positioning of the graft, a 16x20x156 mm stent graft (Endurant® II, Medtronic) was used for the extension to the left iliac artery. Particular attention was paid to keep the left internal iliac artery open. During the procedure, cannulation of the contralateral limb was unable to be achieved because of the tortuous aortoiliac course. Since the patient was unstable, the Endurant system was combined with Talent® Converter stent-graft occluder (20mm, Medtronic, Inc.; Minneapolis, Minn) positioned to right common iliac artery via a 18.5 F introducer sheath. An aortography was made and a minimal leak from the overlap area was observed. Upon this, Reliant® (Medtronic, Inc.; Minneapolis, Minn) baloon catheter was used to expand the stent graft and reinforce the overlap zone. After the closure of the rAAA was confirmed.**(Figure 3)** Additional left-to-right femorofemoral bypass with a 8mm Gore-Tex graft was performed. After succesful closure of the rAAA, the patient was taken to the intensive care unit. Postprocedural hemoglobin was 9.8 g/dl, serum creatinin level was 3.63 mg/dl. The patient was extubated 32 h after the procedure without neurologic dysfunction. Renal failure was expected and the patient was consulted to the nephrology clinic for routine dialysis program. The patient was discharged in the postoperative 7th day.

Discussion

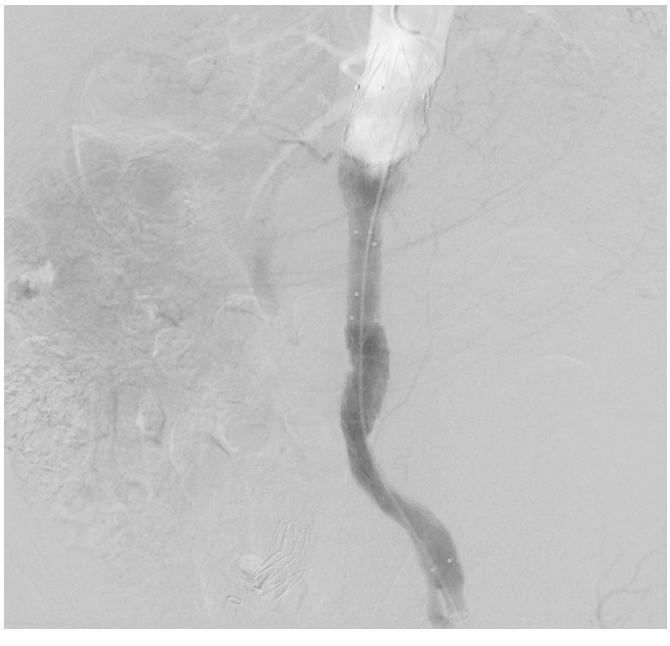
rAAA is a catastrophic condition and the role of rEVAR is still controversial due to the absence of well-supported evidences. Mortality is higher after OR than EVAR according to retrospective studies[4-7] and confirmed by the Swedish Vascular Registry.[8] Furthermore, preoperative shock table and unstable status was found as a major factor predicting mortality rate.[9] Also many publications pointed out that the duration of intensive care is shorter[10,11] and operative blood loss and/or need for transfusion is lowerin rEVAR patients.[12,13] Our patient was followe up for 5 days in ICU and we only gave 2 units of erythrocyte suspension and 2 units of fresh frozen plasma during the operation. Since rEVAR allows the reduction of intraoperative blood loss and the elimination of the aortic clamping and fluid shifts/losses due to a large transperitoneal incision, we did not encountered with a cardiac complication. After overlapping the stent grafts, we observed a type III

Figure 2. Computed-Tomography Scan. Level of rupture was seen.



endoleak from the overlap zone then we fixed it by using a balloon catheter. We also placed an occluder to right common iliac artery to prevent a type II endoleak , as mentioned above. Immediate resuscitation in the emergency department, succesful management of a comatose and unstable patient both in the preoperative and postoperative period protected the patient to have a neurological complication.

Figure 3. Angiographic Image. Succesful closure of the rAAA was seen.



Our first goal was to achieve a safe transfer to the intensive care unit and keep patient alive. Due to lack of every size and types of graft in our hospital and inability to perform a contralateral limb cannulation we had to admit renal complications and ischemia risk of contralateral limb. Femorofemoral bypass surgery prevented ischemic complications but renail failure was occured and the patient became dialysis dependent. On the other hand renal artery occlusion is also a well known complication of EVAR and it can occur by several mechanism.[14-16]

In this case report we aimed to demonstrate the feasibility of emergent rEVAR in a patient with cardiogenic shock and help cardiovascular surgeons for the future. In a this kind of emergent status chosing the treatment modality (open surgery whether endovascular repair) is debatable. Our another goal was to enrich the literature about this kind of medical scenarios . Further studies and long-term results of endovascular procedures in patients with ruptured aort aneursym are still needed.

References

1. LarssonE,GranathF,SwedenborgJetal(2008)Morepatientsare treated for nonruptured abdominal aortic aneurysms, but the pro- portion of women remains unchanged. J Vasc Surg 48(4):802–807
2. Ozdemir BA, Karthikesalingam A, Sinha S et al (2015) Associ- ation of hospital structures with mortality from ruptured abdominal aortic aneurysm. Br J Surg 102(5):516–524
3. Mandawat A, Mandawat A, Sosa JA, Muhs BE, Indes JE. En- dovascular repair is associated with superior clinical outcomes in patients transferred for treatment of ruptured abdominal aortic aneurysms. J Endovasc Ther 2012;19(1):88-95.
4. Lo RC, Bensley RP, Hamdan AD et al (2013) Gender differences in abdominal aortic aneurysm presentation, repair, and mortality in the Vascular Study Group of New England. J Vasc Surg 57(5): 1261–1268
5. Mehta M, Byrne WJ, Robinson H et al (2012) Women derive less benefit from elective endovascular aneurysm repair than men. J Vasc Surg 55(4):906–913
6. de Leur K, Flu HC, Ho GH et al (2015) Outcome of elective treatment of abdominal aortic aneurysm in elderly patients. Int J Surg 15:117–123
7. Ullery BW, Tran K, Chandra V et al (2015) Association of an endovascular-first protocol for ruptured abdominal aortic aneur- ysms with survival and discharge disposition. JAMA Surg 150(11):1058–1065
8. Swedvasc (2015) Swedvasc. Annual report from the Swedish National vascular registry. In: SSVS U (ed.) http://www.ucr.uu. se/swedvasc/
9. Mehta M, Byrne J, Darling RC 3rd, Paty PS, Roddy SP, Krei- enberg PB, et al. Endovascular repair of ruptured infrarenal abdominal aortic aneurysm is associated with lower 30-day mortality and better 5-year survival rates than open surgical repair. J Vasc Surg 2013;57(2):368-75.
10. Wibmer A, Schoder M, Wolff KS et al: Improved survival after abdominal aortic aneurysm rupture by offering both open and endovascular repair. Arch Surg, 2008; 143(6): 544–49; discussion 550
11. Anain PM, Anain JM Sr., Tiso M et al: Early and mid-term results of rup- tured abdominal aortic aneurysms in the endovascular era in a communi- ty hospital. J Vasc Surg, 2007; 46(5): 898–905
12. Anain PM, Anain JM Sr., Tiso M et al: Early and mid-term results of rup- tured abdominal aortic aneurysms in the endovascular era in a communi- ty hospital. J Vasc Surg, 2007; 46(5): 898–905
13. Starnes BW, Quiroga E, Hutter C et al: Management of ruptured abdominal aortic aneurysm in the endovascular era. J Vasc Surg, 2010; 51(1): 9–17; discussion 18
14. Gorich J, Rilinger N, Soldner J, et al. Endovascular repair of aortic aneurysms: treatment of complications. J Endovasc Surg 1999;6:136–14
15. Liewald F, Sharrer-Pamler R, Gorich J, et al. Intraoperative, perioperative, and late complications with endovascular therapy of aortic aneurysm. Eur J Vasc Endovasc Surg 2001; 22:251–256
16. Hausegger KA, Schedlbauer P, Deutschmann HA, Tiesenhausen K. Complications in endoluminal repair of abdominal aortic aneurysms. Eur J Radiol 2001;39:22–33

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