Mycotic Aneurysms of Abdominal aorta and Iliac Vessels

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The term mycotic aneurysm has been maintained for infected aneurysm although the cause very rarely is fungal. Five types of infected aneurysms are mentioned with different pathogenesis. The aim of this paper is to report on four cases of mycotic aneurysm of the aorta and iliac vessels, and to discuss the pathology, clinical findings, diagnosis and outcome of treatment. Four consecutive cases managed in Department of Surgery, Tikur Anbessa Hospital, Addis Ababa during the Years 2000 – 2006 are presented.

Introduction

Abdominal aortic aneurysm is very rarely seen in the surgical department at Tikur Anbessa Hospital, Addis Ababa, and must be very rare in Ethiopia. On the other hand it is common among elderly men in western countries where it is caused by degenerative changes in the aortic wall combined with atherosclerosis. Aneurysm of a different aetiology seems to be more common in Ethiopia. During the years 2000 – 2006 admitted and explored four cases of aortic and iliac artery aneurysms in young and middle aged people. These cases were most likely aneurysms of infectious aetiology, usually classified as mycotic aneurysm. The term '*mycotic'* seem inappropriate since it implies a fungal aetiology which is not the case. The term mycotic has been maintained for aneurysms of infectious etiology. In this review, four cases abdominal aortic aneurysm are presented and their management discussed.

Case Reports

Case 1

A female aged 20 years reported having been ill for 2 months. Presented with a history Severe episodic abdominal pain radiating to the back which was associated with episodic high fever and chills. On examination, an abdominal tender mass in the supraumbilical area measuring 6 x7 cm was found. the mass was also pulsatile and a had a bruit over it.

Ultrasonography of the abdomen proximal to the aortic bifurcation revealed hypoechoic cystic mass of 3x3cm with a regular wall. Blood culture grew Klebsilla pneumoniae.

Operative findings: A pulsating mass just above the aortic bifurcation 5x7cm was found. The mass was dissected after clamping the aorta and iliac arteries and found markedly fused with the inferior vena cava and the ureters by a chronic inflammatory reaction. The aneurysm including the lower 4 cm of the infrarenal aorta was resected. Continuity was restored by interposition graft (PTFT).

Postoperative course was uneventful. The legs were warm with normal movement and sensation, although distal pulses were not well felt.

Subsequently, there was recurrence with the aneurysm of aorta extending to renal and mesenteric vessels. Left renal artery was compressed and it was associated with severe renal hypertension. This needed aortic replacement that was not possible here.

Histopathological Report: Retroperitoneal fibrosis. Chronic nonspecific panniculitis, inflammatory sclerosing non specific process.

Case 2

A 15 –year old male presented with a history of ill health for 3 months associated with with crampy abdominal pain in epigastrium and periumbilical area. He had noticed presence of a pulsating periumbilical mass in the last few months. There was no fever.
Abdominal examination revealed a 6 x 7cm pulsating mass with a systolic bruit in the umbilical area.
Ultrasonography of the abdomen showed a hypoechoic mass at the bifurcation of the aorta. The inner wall of mass was irregular. The left iliac artery was less well visualized. Conclusion was that of aortic aneurysm involving the left iliac artery.

Operative Findings: An aneurysm of the infrarenal aorta involving both iliac arteries was found. Adjacent structures were intimately attached to the aneurysm. A large artery from the left side of the aneurysm going upwards was observed, likely to be a spinal artery. There was considerable extension of the aneurysm to left side of L5 and sacrum. Although ideally resection and prosthetic graft were technically possible, there was no suitable graft available. Consequently, the aneurysm was opened and organized clots were evacuated. A strip of the wall was taken for histopatholgical examination and wall was closed with silk in two layers. Postoperatively, there was good pulsation in both iliac arteries. Aorta clamped for 90 minutes.

Postoperative course: Two days after surgery paraparesis with incontinence of urine and stool. Pulses in femoral and dorsalis pedis arteries were not well felt. Low spinal cord ischemic injury was the probable cause and got progressively worse with necrosis in perineal area and sepsis. This patient died about one month after surgery.

Pathological examination: Fragments from aortic aneurysm showing feature of organized thrombosis. Chronic plasma cellular inflammation and striking amount of entrapped nerves.
Conclusion: Mycotic aneurysm.

Case 3

A 35-years old male with a 1 month history of intense abdominal pain and mass associated with a right leg swelling. On examination there was a right lower quadrant 20 x 10 cm tender nonpulsatile mass with no bruit. Right femoral and dorsalis pedis pulses were absent. Ultrasonography showed a retroperitoneal 10 x 6cm mass with central echolucency anterior to vertebral column and extending to right lower quadrant. CT showed fluid density mass in right psoas area, 10 x 13 cm. irregular contrasts filling of mass and iliac vessels. The right kidney was grossly hydronephrotic.
Operative finding: Found a large aneurysm of bifurcation including right common iliac and internal iliac arteries. The aneurysm was resected (except part of its right posterior wall which was adherent) including the right common iliac artery, which was oversewn

in the aortic bifurcation. Blood flow was restored with aorto-iliac bypass using PTFT graft.

Follow up: Postoperative course was uneventful. The patient was discharged after two weeks. The patient later developed ischemic symptoms in his right leg with intermittent claudication. He had to be sent abroad to a vascular surgery centre for better restoration of blood flow.
Histopathological Findings: Fragment of a right sided aortoiliac aneurysm with features of necrosis and inflammation, consistent with a mycotic aneurysm.

Case 4

A 30 years old male presented with right lower quadrant (RLQ) abdominal progressive swelling for 6 months associated with dull aching pain and low grade intermittent fever. Was seen previously in another hospital and operated on suspicion of appendiceal abscess. Had crampy pain in the right leg radiating down the thigh. On examination a 13 x 15cm firm slightly tender RLQ abdominal mass with bruit was palpated. He has a flexion contracture at the hip and knee of right leg with wasting of thigh and calf muscles. Peripheral pulses were not felt.

Investigations: Hb 11.8g% WBC 5700mm^3, ESR = 110 mm. Blood culture was negative.
US was interpreted as an appendieal abscess
CT scan revealed a significant aneurysmal dilatation of the right iliac artery size 10 x 13 cm. Vessel were surrounded by a hypodense collection along its whole circumference.
Conclusion was that of a right iliac artery aneurysm (dissecting)

Operative finding: A large aneurysm in right iliac fossa displacing the right colon, appendix and aorta to the left side. After vascular control, the aneurysm was opened and old clots removed. There were two small openings on the medial side of the aneurysm to the right common iliac artery. These were sewn over and part of anterior aneurysm wall taken for biopsy. As the aneurysm was fixed, no attempt is made to resect it.

Follow up: Postoperative course is uneventful and patient discharged one week after surgery. When reviewed 4 months after surgery, the patient complained of pain in the right upper thigh. No aggravation on walking. The right leg showed some atrophy as before and was warm. Peripheral pulses were not well felt.

Histopathological findings: Three fragments were examined and involved the entire wall Inner layer a cellular thrombus covering a wall consisting mainly of hyalinized circular collagen fibers which blend outward with a more cellular vascular connective tissue containing small vessels accompanied by a mononuclear inflammatory infiltrate.
Features were consistent with an aneurysm; however, the etiology was not recognizable.

Discussion

Infected or Mycotic aneurysms of the aorta have been known since Sir William Osler described the first case in 1885[1]. The term mycotic aneurysm has been maintained for

infected aneurysm although the cause very rarely is fungal. Five types of infected aneurysms are mentioned with different pathogenesis. The original type of aneurysm described by Osler is caused by septic embolus from cardiac origin. There is also an important type caused by bacteriaemia from other sources. Preexisting aneurysms which are atherosclerotic can be infected. There are pseudoaneurysms caused by vascular external injury and finally there are aneurysms from external contiguous infections.

In the pre-antibiotic era, infected aneurysms were caused by endocarditis. During the later years aneurysms are caused by other infections rather than endocarditis which is well shown in several series of cases[2,3]. The pathogenesis of mycotic aneurysm is septic embolus lodging in an artery causing colonization and disruption of the arterial wall. Bifurcations and other sites of disrupted blood flow predispose to arterial seeding and formation of aneurysms. Often rupture occurs and as blood is contained in the periarterial structures saccular aneurysm is formed. Fusiform infected aneurysms are rare. From the pathological description of our first case this pathogenesis seems likely. Mycotic aneurysms have been observed in most arteries 30% of which are in the aorta[4].

Aneurysms due to bacterial seeding of cardiac origin show growth of Gram positive cocci (in 80% streptococci and 20% staphylococci) and Gram negative bacteria are relatively rare (13%). With other bacteriemias, gram-positive cocci constitute 60%. The causative organism is in 40% of cases staph. Gram-negative infection is present in 35% of cases Salmonella species being the majority[5]. The presumed portal of entry is the gastrointestinal tract. Syphilitic aneurysms are as well caused by a type of microbial arteritis. This type was the common cause of aneurysm of the aortic arch but is now seemingly rare. Our cases were VDRL non-reactive. Depressed imunocompetence is seen in infected aneurysms associated with Steroids, cytotoxic drugs, chronic renal failure, severe alcoholism, old age with atherosclerotic vascular disease, HIV infections[2].

An extravascular infection with contiguous spread to arteries and erosion of the adventitia with aneurysm formation is possible, and most cases have been due to Salmonella species. Few cases of aneurysm caused by Tb have been described.

Our cases have presented with abdominal pain, pulsating mass and a bruit. Our first case had repeated episodes of fever up to 39^0C. The fourth had intermittent fever while the second and third had none. The presence of an infected abdominal aneurysm should be suspected in any patient presenting with an aneurysm and features of sepsis. However the signs of sepsis may be restricted to fever alone. Forty percent (40%) of infected abdominal aneurysms were not recognized prior to rupture[6]. In the history, endocarditis should be sought. The presentation is often very subtle.

There is no preoperative study sufficiently sensitive to rule out infection. Patients who have not been started on antibiotic therapy will have leucocytosis[7]. The finding of a positive blood culture in a patient with an aneurysm makes the diagnosis of infected aneurysm likely. Repeated aerobic and anaerobic cultures should be processed. Negative cultures however do not exclude an infected aneurysm. Only half had a positive culture[6].

Imaging studies are necessary to demonstrate the presence of the aneurysm and to define the arterial anatomy for planning surgery. Plain abdominal films are valuable in detecting calcifications and erosions of vertebra[7]. Calcifications do not appear in infected aneurysms. One of our cases had certainly erosion of L5 and sacrum. US examination has verified the presence and extent of aneurysms in our cases. CT scan is reported to be superior in defining the borders of an aneurysm and its shape as saccular or different. Even gas can be detected in the thrombus in some cases of infection. Arteriography is important prior to an operation to find out the precise arterial anatomy and the presence of embolism distal to the aneurysm. Such occlusion occurred in our second case causing spinal ischemia and partial obstruction to the left leg.

Infected aneurysm of the abdominal aorta has a very high tendency to rupture and should be operated when it is detected. In case of rupture the mortality is very high. The aim of therapy before surgery is antimicrobial control of sepsis. However the preoperative care should only be brief as identification of the offending organism by culture is possible only in half of the cases. In the absence of culture and sensitivity, antimicrobial therapy has to be empirical based on known aetiological factors and hence has to cover Gram negative and positive as well as anaerobic organisms. Later information about nature of infection should be sought from surgical specimen using Gram stain.

Mycotic aneurysm should be resected with extensive debridement of infected tissue. For restoration of flow two options are available.

1. Aortic transection and closing of aortic stump and axillofemoral bypass[7] which may be unilateral or bilateral. These bypasses have poor prognosis and may be occluded in the following years in as high as 80% of cases.
2. Immediate interposition graft. High risk cases for infection in the wound are excluded; where pus is seen at surgery[8].

Earlier reports of surgical interventions in these cases have shown very high mortality. However, according to later reports mortality had declined and was 14% in a collected series of 22 cases[9].

Our first case was given an interposition graft, PFTF, and the result was good. Histology has shown the presence of chronic is inflammation. No signs of local sepsis were seen at surgery. However the patient had intermittent fever and was given preoperative antimicrobial treatment. Our second case had no resection. Complications after surgery were more from embolism than sepsis. In the third and fourth cases large saccular aneurysms in the right iliac fossa were found with communication to the common iliac arteries. The aneurysms were not resected due to very little evidence of local sepsis and technical difficulty. Restoration of flow was made with aorto-iliac bypass in the 3rd case. In the fourth case the flow in the iliac artery was intact and the communication simply closed by sutures. The third case had microscopic findings consistent with a mycotic aneurysm. In the fourth the pathological findings were not entirely clear but showed inflammatory changes in the excised aneurysm wall.

From this presentation and review of the literature regarding abdominal aortic infected or mycotic aneurysm the management is a very demanding task for a surgeon. Diagnosis is clear by Ultrasound and CT scan and the inflammatory nature in some cases can be found by a positive blood culture. Surgery is necessary as all cases are bound to rupture. The procedure is excision of the aneurysm and restoration of flow by synthetic grafts. The prognosis is affected by operative mortality and complications.

Conclusion

Mycotic aneurysm of the Aorta and Iliac vessels should be considered as rare and difficult to tackle. Nowadays aneurysms are caused by staphylococci and Gram negative rods originating from the GI tract. Early resection with restoration of flow by grafts is mandatory. Primary results indicate late complications after surgery are frequent.

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