Cutaneous anthrax as an occupational disease in Central Anatolia, Turkey

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Anthrax is a zoonosis which is caused by the spore-forming bacterium *Bacillus anthracis* (*B. anthracis*). Except for bioterrorism, human infections result from contact with contaminated animals or animal products. Cutaneous anthrax (CA), which has accounted for >95% of reported cases in the world, occurs as a result of direct contact with *B. anthracis*.[1] It remains a considerable public health concern in Turkey, as so in many developing countries.[2,3] In 2003, the incidence of anthracis in Turkey was 0.45/100,000. In this study, we describe the clinical characteristics, treatment and final outcomes of 20 patients who were diagnosed with CA and was treated in our hospital between 1999 and 2003.

In this retrospective study, the records of 20 patients who were diagnosed and treated for CA in the Department of Infectious Diseases and Clinical Microbiology of Health Ministry Ankara Training and Research Hospital, Ankara, Turkey were reviewed. The diagnosis of CA was made by either typical clinical appearance (a painless, pruritic ulcer covered by a characteristic black eschar) or by revealing *B. anthracis* bacilli microscopically or on culture. Gram staining and lesions cultures were performed on all patients. Drugs used to treat were procaine penicillin or ampicillin/sulbactam as monotherapy, or ampicillin/sulbactam and ciprofloxacin combination according to the existence of secondary infection. After completion of treatment, patients were followed up for one month.

There were 16 men and 4 women, with an age range of 16-64 years, enrolled in the study. Except for one patient, all patients worked in a farm and lived in rural areas of Central Anatolia. All of them had a history of contact with an animal. During the study period, a total number of 2111 anthrax cases were reported all over Turkey and 82 of them were from our region. Our cases were 0.95% of all the cases reported in Turkey. All patients complained regarding painless, pruritic black color eschar on their hand or arm, except one whose lesion was below the eye lid. Clinical features of the patients were shown on **Table 1**. Four of the 20 patients had additional lymphangitis and lymphadenopathy. Fever was detected in 4 of them. Clinical presentation was typical in all cases. Bacteriological sampling was carried out to all the patients. *Bacillus anthracis* was isolated in 3 of the patients. Eleven patients were diagnosed as a result of their clinical presentation. A history of previous antibiotic usage before admission was detected in 10 of these 11 patients. Clinical findings and gram staining positivity were detected in the remaining 6 patients.

Secondary infection was detected in 7 of the patients and methicillin sensitive *Staphylococcus aureus* was the most causative agent. Seven patients were treated with procaine penicillin G. Ampicillin/sulbactam was preferred in 8 patients. In 5 patients, ciprofloxacin ± ampicillin/sulbactam was used for 10-21 days. In 2 patients, who were on ciprofloxacin treatment, edema and lymphangitis did not resolve at the seventh day of treatment. A response was seen when ampicillin/sulbactam was added to the treatment. Complications were detected in 3 patients at the end of the treatment. One patient lost vision of her eye due to the lesion under her left eyelid; 2 other patients needed surgical debridement and a surgical reconstruction operation due to the great tissue loss.

The incidence of anthrax is decreasing worldwide, but it is still encountered in Turkey especially in the parts where the people mostly deal with animals.[2,3] Although there has been a decline in the number of animal anthrax cases in recent years, anthrax has not been eradicated in Turkey. Cutaneous anthrax is usually caused by the handling of infected animals or their products. All our cases, except one patient, were living in the agricultural regions of Turkey and handling with animals and their products. All of them had a history of contact with an animal.

The primary skin lesion of CA is a nondescript, painless, pruritic papule that appears 3-5 days after the introduction of endospores. The most common areas of exposure are the head, neck, and extremities.[1] In our series, all our patients had an ulcer and black lesion of various diameters, all located on the hand or arm except one which was on face. Anthrax edema presents with excessive accumulation of fluid within the tissues. In 5 patients there was a distinct edema, and in 2 other patients, extensive edema was detected around the lesion. The diagnosis of CA could be made on the basis of clinical findings and history of exposure to animals or animal products. The *B. anthracis* could be revealed microscopically and through culture. Beside these diagnostic methods, enzyme-linked immunoadsorbent assays and polymerase chain reaction as a new diagnostic technique could be used for the diagnosis.[1,4] Such as the other studies, our study patients were also diagnosed either by lesion

Table1 - Clinical features and treatment of patients with cutaneous anthrax.

Patient no.	Gender	Age	Feature and the site of the lesion	Blood leukocyte count/mm^3	Smear	Culture	Treatment (duration of treatment)
1	F	40	Black necrotic central eschar, 2 cm in diameter below the left eye-lid, surrounded by hyperemia and extensive edema of the face	15,600	(-)	(-)	SAM + CIP (45 days)
2	M	26	Black color eschar 7 cm in diameter medial side of the right forearm	18,000	(+)	(-)	SAM (21 days)
3	F	64	Black color eschar 1 cm in diameter on the distal digit of the left thumb	7,300	(-)	(-)	SAM (14 days)
4	M	34	Black color eschar 1 cm in diameter on the distal digit of the left thumb	11,900	(+)	(+)	Procaine penicillin (14 days)
5	M	55	Black color eschar 0.5 cm in diameter and extensive edema on the distal digit of the left fourth finger	12,600	(-)	(+)	SAM (10 days)
6	F	51	Black color eschar 2.5 cm in diameter medial side of the right forearm	13,800	(-)	(-)	SAM + CIP (14 days)
7	M	50	Black color eschar 0.5 cm in diameter on the third finger of the right hand	11,000	(-)	(-)	Procaine penicillin (14 days)
8	M	62	Black color eschar 1 cm in diameter and edema on the proximal digit of the left thumb	4,400	(-)	(-)	Procaine penicillin (14 days)
9	M	27	Black color eschar 2 cm in diameter and extensive edema on the dorsal side of the right hand	13,900	(+)	(-)	Procaine penicillin (14 days)
10	M	60	Black color eschar 1 cm in diameter on the third finger of the left hand	9,500	(+)	(-)	SAM + CIP (14 days)
11	M	16	Black color eschar 0.5 cm in diameter on the fourth finger of the left hand	6,800	(+)	(-)	Procaine penicillin (14 days)
12	M	55	Black color eschar 1 cm in diameter on dorsal side of left hand, near the thumb	9,000	(-)	(-)	SAM + CIP (21 days)
13	M	32	Black color eschar 1 cm in diameter on dorsal side of right hand	9,000	(+)	(-)	SAM (10 days)
14	M	56	Black color eschar 3-4 cm in diameter and extensive edema on dorsal side of the left hand	18,900	(-)	(-)	SAM + CIP (21days)
15	M	17	Black color eschar 2 cm in diameter medial side of the right forearm	10,200	(-)	(-)	SAM (14 days)
16	M	39	Black color eschar 1 cm in diameter on the second finger of the left hand	4,400	(-)	(-)	SAM (10 days)
17	F	35	Black color eschar 1 cm in diameter on the third finger of the right hand	9,500	(+)	(-)	SAM (14 days)
18	M	40	Black color eschar 1 cm in diameter and edema on the proximal digit of the right thumb	8,600	(-)	(-)	Procaine penicillin (14 days)
19	M	47	Black color eschar 2 cm in diameter and extensive edema on the dorsal side of the right hand	9,800	(+)	(+)	SAM (14 days)
20	M	19	Black color eschar 0.5 cm in diameter on the second finger of the right hand	6,200	(-)	(-)	Procaine penicillin (14 days)

SAM - ampicillin/sulbactam, CIP - ciprofloxacin

presentation or demonstration of *B. anthracis* on the lesion.

The *B. anthracis* is easily subdued by many antibiotics, such as penicillin, erythromycin, ciprofloxacin, doxycycline, and even chloramphenicol. The standard treatment for anthrax was penicillin due to its low cost and vast availability. However, after the outbreak in the United States in 2001, Centers for Disease Control and Prevention changed its recommendations for the treatment of anthrax.[5] In our study, we treated most of our patients with penicillin or its derivatives. Five of them were treated with ciprofloxacin. In 2 patients who were on ciprofloxacin treatment, edema and lymphangitis did not resolve on the seventh day of treatment. We thought there might be a secondary infections due to anaerobic microorganisms and a response was detected when ampicillin/sulbactam was added to the treatment. In studies concerning the antimicrobial susceptibility of *B. anthracis* performed in Turkey and in other countries, all the tested *B. anthracis* organisms were susceptible to penicillin and none of them produced beta-lactamases.[2,3] Penicillin which is a less expensive antibiotic than fluoroquinolones, is still the first line drug choice for the treatment of CA in our country. The recommended time course for the treatment of CA is 60 days in the context of bioterrorism, as opposed to 7-10 days for naturally acquired disease.[5,6] As all our cases were naturally acquired diseases, we treated most of them with duration of 10-21 days depending on either severity of the infection or presence of secondary infections.

In conclusion, in developing countries where animal anthrax has not been eradicated, CA remains an occupational hazard for herdsmen and workers. Cutaneous anthrax should be thought of for differential diagnosis of lesions, which consist of black color eschars. Typical clinical appearance of the lesions is mostly sufficient for the diagnosis, but anthrax bacilli is easily identified from Gram-stained smears and cultures of the vesicular fluid. Penicillin, ciprofloxacin, and doxycline could be used for the medical treatment of the lesions. Control of CA in humans ultimately depends upon control of the disease in animals.

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Congenital renal anomalies

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The kidneys develop in the pelvic cavity and migrate cranially during the first trimester of gestation to acquire their normal position in the retroperitoneal space high on the posterior abdominal wall. Simultaneously, the kidneys rotate 90° medially so that the renal pelvis lies on the anteromedial aspect of the kidneys. Failure of migration is common and gives rise to pelvic kidney. During the intrapelvic stage, the kidneys are supplied by sacral branches of the aorta, but during their ascent into the abdominal cavity, the kidneys acquire successively higher branches of the aorta up to the definitive renal arteries. Failure of regression of inferior branches from the aorta gives rise to accessory renal arteries. Most of the congenital renal variants are due to disturbance in the ascent of the kidney or their rotation.[1] The availability of 'state-of-the-art' technology of multislice CT (MSCT) 16-slice scanner has revolutionized the evaluation of the renal anomalies,[2] as it is far superior to any other imaging modality in describing the detail of the vascular anatomy besides the morphology of the kidneys. In this report, we illustrate 4 commoner examples of congenital renal anomalies.

Horse-shoe kidney. In utero contact between the metanephric tissues of the developing kidneys results in a midline connection called isthmus. The isthmus can be a block of parenchymal tissue or less commonly, fibrous tissue. The ascent of fused kidneys

is retarded with isthmus impinging on the inferior mesenteric artery. There is associated malrotation and accessory vessels. The incidence of horse-shoe kidney is 0.2-1% in autopsy series, and 1/400 live births. It is twice more commonly seen in males than in females. There is fusion of the lower pole of both kidneys in 90% of cases, while in 10% the upper poles are fused. The long axis of the kidneys is oriented medially and the preaortic renal isthmus is usually seen at L4/L5 level. The renal pelvis and ureters are oriented anteriorly. There is an increased incidence of renal calculi, presumably due to poor drainage of the pelvicalyceal systems with ureters running anteriorly over the isthmus. There is 50% association with hydronephrosis, vesico-ureteric reflux. Horse-shoe kidney is associated with cardiovascular, skeletal, central nervous system anomalies, anorectal malformation, and genitourinary anomalies like hypospadias, undescended testis, and ureteral duplication. Renal anomalies have been reported in association with congenital scoliosis. It is also associated with Trisomy 18 and Turners' syndrome. There is an increased risk of Wilms' tumor in patients with horse-shoe kidney.

Crossed fused ectopia. Crossed renal ectopia is a rare congenital anomaly with an incidence of 1 in 1000 live births. Both kidneys are seen fused completely and lying superolaterally on one side. It is more common on the right side with male predilection. It is invariably associated with aberrant renal arteries. The ureter draining the upper moiety inserts orthotopically on the ipsilateral side of the bladder, while the lower moiety ureter also inserts orthotopically but into the contralateral side of the bladder. The multislice CT scan is the imaging modality of choice due to its superior spatial resolution. Watanabe in 2002[3] reported reflux nephropathy in association with crossed fused renal ectopia. Bailey et al[4] in 2002 reported successful transplantation of crossed fused ectopic kidneys into a single recipient.

Renal ectopia. The incidence of renal ectopia is 0.2% in autopsy series. The normal location of the kidneys is at the level of first to third lumbar vertebrae. Failure of complete ascent to its normal location results in longitudinal ectopia. The pelvic kidney is encountered in 1/725 live births. The aberrant renal arteries are seen in all the cases. It is commonly associated with hypospadias. Hydronephrosis is frequently seen, probably due to abnormally high insertion of the ureter into the renal pelvis. Pelvic kidney may be associated with vesico-ureteric reflux. When both kidneys are pelvic in location, they may fuse[5] and have 'pancake' appearance, and maybe drained by a single ureter as reported by Calado et al in 2004.[6] Cases of intra-thoracic kidney have also been reported.

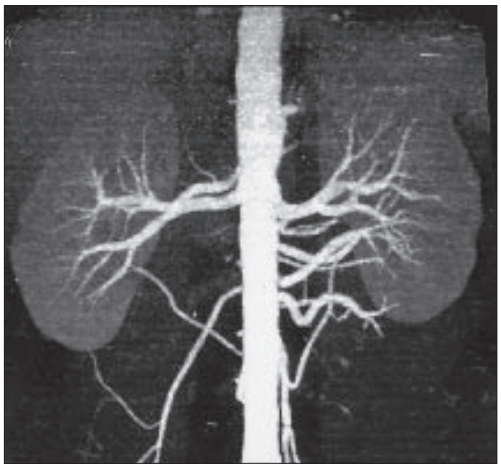

Figure 1 - 3-D Maximum Intensity Projection (MIP) image showing multiple accessory arteries to both kidneys.

Renal vascular anomaly. During the embryological ascent of the kidneys in the first trimester, they sequentially acquire and then lose arteries along the iliac vessels and then the abdominal aorta. Failure of involution of one or more of these is a common developmental variant[7] and is seen in up to 25% of live births. These are more commonly seen associated with malascent of the kidneys. The presence of an accessory renal artery[8] is of significance especially when surgical procedures, such as, partial nephrectomy or renal transplantation are being considered (**Figure 1**). With the advent of 'state-of-the-art' multi-slice CT scans, the documentation of accessory renal arteries less than 2 mm in diameter has become possible.

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Acute surgical abdomen in pregnancy

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Pregnancy is a 'high-risk' period in the female reproductive life. In addition to the extensive physiological changes, it may be associated with complications such as ectopic pregnancy, placental abruption, twisted ovarian cyst and red fibroid degeneration. Furthermore, variety of acute general surgical conditions such as appendicitis, cholecystitis, pancreatitis and intestinal obstruction can also occur during pregnancy. Accurate diagnosis of such conditions and timely surgical intervention during pregnancy presents a formidable challenge to surgeons and obstetricians. This is attributed to the anatomical and physiological changes of pregnancy that lead to both modifications of the usual presentation of signs and symptoms and to the fact that early symptoms of an acute abdomen resemble the common symptoms of early pregnancy. Another matter that complicates management is the special attention, which has to be paid to the fetal well-being. Therefore, delays in diagnosis and management of acute abdomen in pregnancy are common and continue to pose a significant risk to both mother and fetus. General surgical problems in pregnancy are relatively uncommon, and the most common non-obstetric cause of surgery is appendicitis.[1] Gangrenous appendicitis is common in pregnancy as a result of increased pelvic vascularity and higher risk of appendiceal strangulation. Moreover, interference with omental migration by the gravid uterus may explain 2-3 times higher rate of perforation with 33% risk of fetal loss. The separation of abdominal viscera from the abdominal wall by the uterus precludes some vital diagnostic clinical signs,[1,2] and contributes to further delays in diagnosis and management with higher fetal and maternal death rates.[1] Biliary tract disease is the second most frequent intra-abdominal inflammatory condition during pregnancy. Biliary stasis is common resulting in gallstone formation in 3-4% of pregnant women[1] but fortunately gallstone-related complications are not common. During pregnancy, it is important to be aware of altered normal ranges of some common laboratory blood tests. Such changes can create difficulties during the initial evaluation process. For example, an elevated white blood cell count as high as 16,000-20,000/mm^3 that occurs during pregnancy[3] may be mistaken for an inflammatory condition such as appendicitis. Although, there is general reluctance to perform abdominal radiographs during pregnancy, a single exposure has no harmful fetal effects and should be considered especially if intestinal obstruction or perforation is suspected. By far, the most frequently used radiological modality for evaluating a pregnant abdomen is ultrasonography. It helps in evaluating the maternal intra-abdominal organs, and allows the evaluation of fetal viability and gestational age. Magnetic resonance imaging is considered safe during pregnancy, but it must be avoided in the first trimester. When faced with acute abdomen during pregnancy, general surgeons are hesitant to operate early due to fear of negative laparotomy and usually prefer to wait until florid signs are apparent. Peritonitis may occur with high rates of maternal morbidity and fetal loss. However, early surgical intervention may trigger uterine contractions and abortions. The use of tocolytics to calm the uterus was advocated but with great caution in selected cases as they are of doubtful benefits and have serious side effects.[4] Early surgery is associated with less abortions and preterm labors than expectant management and therefore, is emerging as the treatment of choice for acute abdomen during pregnancy. There is now general agreement about the timing of surgery during pregnancy. While high rate of miscarriage occurs in the first trimester, preterm labor is common in the third trimester but, without fetal loss.[5] It is now established that the second trimester is the safest period for any surgical intervention during pregnancy. Hence, for non-urgent surgical conditions that present in the first trimester, surgery may be delayed until the second trimester and for those presenting in the third trimester, surgery may be deferred, if possible, until after delivery. In the past, pregnancy was considered an absolute contraindication for laparoscopy. Recently, laparoscopy has been increasingly used in diagnosis and management of acute abdomen and reports of its successful use even in the third trimester are emerging.[5,6] The safest reported

time is the second trimester. In pregnancy, laparoscopy has many advantages over laparotomy and is recommended for achievement of good maternal and fetal outcomes. Poor fetal outcome, however, appears to be related to the underlying pathology, and not to the operative procedure per se.[7] One must remember that laparoscopy can be complicated by injury to the gravid uterus and fetal loss if certain precautions are not taken. It is advisable to use the Hasson open technique for induction of pneumoperitoneum to avoid trocar injury to uterus and fetus, and to adjust the location of trocar placement according to the uterine size. Uterine manipulation is kept to the minimum and fetal heart is monitored during the procedure. Finally, an experienced laparoscopic surgeon should carry out the procedure to keep operation times as short as possible.[5-7]

Motherhood is the dream of every female and our duty as clinicians is to fulfill this dream with minimal maternal morbidity and fetal loss. This can only be achieved by close collaboration, in management of acute abdomen in pregnancy, between surgeons and obstetricians to reduce maternal morbidity and fetal mortality. The safest time for surgery is the second trimester. Because of its numerous advantages, laparoscopy is emerging as the best diagnostic and therapeutic surgical option for acute abdomen in pregnancy and despite some technical difficulties, it can be performed safely even in the third trimester but certain precautions have to be taken.

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Comparison of early results of limited thoracotomy versus complete sternotomy in atrial septal defect closure

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Atrial septal defects (ASD) are classified according to their position on the septum. Ostium secundum is located in the region of fossa ovalis, ostium primum in the inferior portion of the inter atrial septum, and sinus septum, and sinus venous in the superior portion of the septum near the junction of the superior vena cava and right atrium. Ostium primum is often seen with other developmental defects of endocardial cushion, such as mitral valve defect or interventricular septal defect. Sinus venous defect is also associated with relative abnormality of pulmonary vein return. In this abnormality, a pulmonary vein enters the right atrium or vena cava instead of the left atrium, causing increase in right to left shunt. In most inter atrial defects, the pressures in the 2 atriums are equal, and the severity of shunt depends on relative compliance of right ventricle and pulmonary arteries in comparison with left ventricle and systemic arteries rather than pressure difference between atria. Pulmonary vascular resistance and pulmonary arterial pressure causes pulmonary hypertension and right to left shunt (Eisenmenger's syndrome). An ASD may be missed in childhood because of absence of paucity of clinical symptoms, and the ejection murmur due to an increase in blood flow across the pulmonary valve may be considered as a functional murmur. It is expected that these patients will reach adolescence, however, their life span is shorter than normal patients. Their death is usually due to heart failure. Some have pulmonary hypertension at a young age. Overall, atrial tachycardia is frequent in patients older than 40 years old, in addition to findings related to congestive heart failure. This defect should be repaired after surgery or closed by interventionist in all patients.[1] It must be mentioned that, currently ASD closure by surgery is safe and more effective than non surgical (interventional) modalities.[1] Median sternotomy is the standard method for surgery of intra cardiac congenital lesions, however, it leaves a bad scar at the incision site, and its probable complications may cause problems for the patient. Cosmetically, using the thoracotomy method in females is preferred. Currently, closures of inter ASDs are also performed by endoscopy and videoscopy, and extracorporeal blood circulation to

femoral cannulation.[2] The advantages of minimally invasive surgical methods include: low pain, minimal skin incision, acceleration of recovery and resume activities, and shortening of the hospitalization period and stay in the intensive care unit (ICU).[2] The aim of this study is a comparison of postoperative results in 2 groups of patients undergoing to surgical closure of ASD by 2 methods, namely, sternotomy or thoracotomy, in Shahid Madani heart hospital Tabriz, Iran.

This is a retrospective study, wherein the records of 73 patients that underwent surgery for closure of ASD by either sternotomy or thoracotomy from 1998 to 2003 were assessed. The information was collected by questionnaire including pre, post and intraoperative data, and analyzed by Fisher and Mann-Whitney test. A *p*-value of less than 0.05 was considered significant. The patients were classified as group I (thoracotomy) and group II (sternotomy). Patients with ASD, partial or complete attachment abnormality of pulmonary veins, partial or complete atrioventricular canal, and mitral, tricuspid or pulmonary lesions, were evaluated in this study. The patients with ASD and aortic valve or coronary artery disease and other emergency situations excluded from research. The surgical method was suggested by the surgeon, and with patient consent especially in females.

In this study, the records of 73 patients were assessed. The average blood transfusion in group I was 323.63 ml, and in group II, 342.85 ml (p=0.32). The average stay in the ICU was 2.28 days in group I, and 2.48 days in group II (p=0.136). There was no significant difference regarding need for transfusion, mortality, need for reoperation and complications between the groups. Hospitalization time was 10.8 days in group I and 12.79 days in group II (p=0.01). The duration of surgery was 4.33 hours in group I, and 3.43 hours in group II (p=0.000). The duration of

Table 1 - Results of repair of ASD and associated lesions in both groups operated upon with thoracotomy (group I) and complete sternotomy (group II).

Variable	Number		Average		Standard deviation		Error deviation (average)		*P*-value
	Group I	Group II	Group I	Group II	Group I	Group II	Group I	Group II	
Age (year)	38	35	32.84	21.82	12.28	16.39	1.99	2.77	0.359
Body surface (m^2)	-	-	1.41	1.22	0.35	0.47	0.05	0.08	0.075
EF (%)	-	-	59.78	61.07	10.94	9.49	1.77	1.6	0.684
Operation time (hours)	-	-	4.33	3.43	0.88	1.18	0.14	0.19	0.000
Aorta clamping time (minutes)	34	35	32.35	35.88	20.44	30.17	3.50	5.09	0.414
Pump time (minutes)	38	35	65.68	69.48	27.66	48.21	4.48	8.14	0.279
Mechanical ventilation (hours)	37	34	9.14	12.06	10.30	10.69	1.69	1.83	0.128
Stay in ICU (days)	37	34	2.28	2.48	1.42	1.07	0.23	0.18	0.136
Hospitalization time (days)	36	34	10.08	12.79	4.19	6.36	0.69	1.09	0.01
Blood transfusion (ml)	22	21	323.63	342.85	142.78	266.12	30.44	58.7	0.380
Plasma transfusion (ml)	27	36	527.77	604.23	384.89	526.52	74.97	103.25	0.572
First postoperative day drainage (ml)	36	34	264.72	325	230.21	298.88	38.36	51.25	0.557
Second postoperative day drainage (ml)	36	34	205.13	123.67	267.44	127.49	61.24	21.86	0.427
Total postoperative draining (ml)	36	34	469.86	448.67	437.2	379.83	72.86	65.14	0.791
Mortality (number)	38	35	2	1	-	-	-	-	0.531
Re-operation	38	35	1	-	-	-	-	-	0.732
Complications	38	35	9	10	-	-	-	-	0.417

EF – ejection fraction, ICU – intensive care unit, ASD - atrial septal defects

mechanical ventilation was 9.14 hours in group I, and 12.06 in group II (p=0.12). There was no significant difference regarding amount of bleeding between the groups. Nearly all patients tend to surgery with smaller incisions, so that there is no disadvantage regarding operation quality and safeness. Although operation time in sternotomy group was less than in patients underwent limited thoracotomy, it should be considered that we may spend further time for noninvasive, or less invasive procedures but, in turn, the better results with more operative trauma to patient, cause earlier discharge and recovery of patient, to resume normal activities. **Table 1** shows the results of operation in both groups.

Although median sternotomy is the gold standard method for repair of congenital heart disease, large incision, postoperative pain, disadvantages due to cosmetic injuries, and the possibility of complications resulting from sternotomy, such as sternal dehiscence, osteomyelitis, and mediastinitis, cause this procedure to be substituted with less invasive procedures, such as minimally invasive thoracotomy with videoscopy, or moderate or more extended thoracotomies with direct access and surgical repair with direct sutures.[2] Prior experiences of surgeons also suggest that less invasive surgeries of the thorax and heart are safe with minimal postoperative pain, earlier return to activity, excellent results obtained from repair regarding cosmetic aspects, less hospitalization period, and consequently, less costs for patients.[2] With regard to the number of operated patients, there was a low percent of complications, including 2 cases of death in the less invasive group, and one case in the median sternotomy group, and also reoperation with repair by prosthetic ring of mitral valve. However, overall there was no significant difference in mortality and morbidity between the 2 groups. The cause of death in the mentioned cases was not surgical, but low cardiac output and intolerance of the discontinuation of extra corporeal circulation. In less invasive surgeries, in order to prevent reoperation, we can routinely use transesophageal echocardiography (TEE), resulting in a decrease in this complication. Although in less invasive surgeries for congenital heart disease, we can use femoral artery and vein cannulation, in surgeries for ASD by the less invasive method, the cannulation of the aorta and superior and inferior vena cava is difficult, especially in young children with low weight (less than 15 kg) who may have a femoral artery and vein of unsuitable diameter for cannulation.[2] Repair surgery for ASD by smaller and limited incisions have had acceptable results. These incisions have been made in the median, and inferior part(s) of the sternum, or both, with skin incisions even smaller than a sternal incision; and the extension of the sternal incision through release of subcutaneous tissue is possible. In this method cannulation of superior and inferior vena cava via right atrium is also possible.[3] Although sufficient myocardial support has also been achieved by continuous cardiac perfusion without clamping of the ascending aorta in some studies, stopping of heart beat by cold cardioplegia is the standard support.[2] In most of our patients, the choice method for protection from the myocardium was clamping of the ascending aorta and injection of a cardioplegic agent into the aortic root. In less invasive cardiac operations such as ASD repair, prevention from air embolism is one of the most important problems that should be considered during operation, especially in discontinuation of pump. Initially, de-airing of cardiac chambers must be performed and the absence of air must be documented by TEE.

Overall, repair of ASD and associated lesions such as ostium primum and sinus venous can also be performed by a less invasive method. However, the placement of defibrillator pads in a suitable location before dressing the patient, and replacement of the probe for TEE during operation for assessment of valvular function, performed repair and residual air within cardiac chambers is necessary. There are various minimally invasive methods for rapid access to the operation site in ASD repair surgery, depending on ASD type and associated lesions, patient's tendency, surgeon's experience and accessibility of equipment. However, regardless of interventional methods with their specific criteria, it seems that right limited anterior thoracotomy is a suitable alternative method.[4] Although there was no apparent advantage of the less invasive method in our patients, with the present equipment in our center we obtained acceptable results in comparison with conventional methods. Other surgeons have also encountered lower mortality and morbidity, and acceptable cosmetic results with this method.[5]

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Open tibial fractures

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Open tibial fractures are frequently encountered in modern urban society. Road traffic accidents remain the leading cause for such fractures. Saudi Arabia has a high incidence of road traffic accidents, thus contributing to a high incidence of tibial fractures. Successful treatment of these fractures involves prevention of infection, achievement of bony union and restoration of function.[1] These goals are achieved through meticulous irrigation and debridement of soft tissues and stabilization of fracture. One of the most concerning complications is fracture site infection.[2,3] In this report, we present our experience in managing compound tibial fractures and their complications. This was a retrospective analysis of patients who were admitted to our hospital (King Fahad National Guard Hospital, Riyadh, Saudi Arabia) in the period between January 1998 and January 2001 with the diagnosis of open tibial fractures. Multiple trauma patients are managed by a multidisciplinary team approach that follows the Advanced Trauma Life Support (ATLS) protocols and involves the activation of a dedicated trauma team. Isolated orthopedic injuries are managed by the orthopedic trauma service. Open fractures are treated as an orthopedic emergency by removing foreign bodies and gross contamination, initial splinting in a back slab, administration of analgesics, broad spectrum antibiotics, tetanus prophylaxis, and coverage with a sterile dressing. The patient is taken to the operating room on urgent basis for debridement and irrigation of the soft tissues followed by stabilization of the fracture. The method of stabilization depends on the type of fracture and the extent of soft tissue damage. The fractures were classified according to the system of Gustilo and Anderson, and modified by Gustilo, Mendoza, and Williams.[4] Fracture stabilization was achieved by using either external fixation or internal fixation in the form of intramedullary nailing or plating or K-wire fixation. Plastic surgeons were involved for soft tissue or skin defects. Vascular surgeons were involved for vascular injury. Intraoperative swab was taken at the end of debridement and the original wound due to the fracture was left open, and broad spectrum antibiotics were continued postoperatively. The patient is taken again to the operating room after 2-3 days for inspection, further debridement and delayed primary closure of the wound. The antibiotics are continued for further 48 hours after closure of the wound. Patients who developed infections were treated by a multidisciplinary team approach that involved orthopedic surgery, infectious disease specialist and a plastic surgeon when indicated. The management generally involves stabilization of the fracture, drainage of abscesses, resection of devitalized and infected tissues, and antibiotic administration. Bone and soft tissue defects that result from the debridement are treated by various techniques such as flap coverage, bone grafts, or bone transfer techniques. Medical records were examined for demographic data, cause of injury, associated injuries, pre-existing co-morbid conditions, surgical and non-surgical treatment of the injuries, complications, and outcome. Particular emphasis was placed on those patients who developed infection of their fractured tibia. All radiographs were reviewed for healing of the fracture, hardware related problems, and any evidence of recurrent infection.

A total of 47 patients with 47 open tibial fractures were included in this study. Seven patients were lost to follow up. The remaining 40 (85%) patients (40 tibias) were followed up for a mean period of 15 (10 -24) months. For the whole group of 47 patients, there were 44 males and 3 females. Their mean age was 27 (3-70) years. There were pre-existing illnesses in 4 patients. These included diabetes mellitus in 3 patients, hypertension in 2 patients, and bronchial asthma in one patient. The cause of open tibial fracture was road traffic accidents in 41 (87%) patients, fall from height in 4 (8.5%), and sports related injuries in 2 (4%) patients. The right tibia was involved in 26 (55%) patients and the left tibia in 2 (45%) patients. The fracture involved the proximal one third of the tibia in 10 (21%) patients, middle one third in 14 (30%), and distal one third in the remaining 23 (49%). The fracture pattern was oblique in 12 (25%), butterfly in 8 (17%), segmental in 8 (17%), comminuted in 7 (15%), transverse in 6 (13%), and

spiral in 6 (13%). There were 14 (28%) Gustilo type I fractures, 13 (27%) type II, 10 (22%) type IIIA, 9 (18%) type IIIB, and 1 (2%) type IIIC fractures. Other bone fractures occurred in 36 (77%) patients. These included 14 fibular fractures, 9 femoral fractures, 6 humeral fractures, 3 pelvic fractures, 1 clavicle fracture, 2 skull fractures, 2 calcaneal fractures, 2 patellar fractures, 2 facial bone fractures, 3 foot fractures, 2 forearm fractures and one cervical spine fracture. Other system injuries occurred in 21 (45%) patients. These included head injuries in 12 patients, liver and spleen injuries in 2, urethral injuries in 2, and blunt chest trauma in 2. Of the whole group of 47 patients, 12 (26%) were admitted to the intensive care unit (ICU) due to the initial multiple trauma. Their mean length of stay in the ICU was 7 (1-16) days. For the open tibial fractures, the mean duration until the patients were taken to the operating room was 9 (2-75) hours. Twenty-two (47%) patients were taken to the operating room within 6 hours from the time of injury. The first surgery type was irrigation, debridement and fixation in 34 (72%) patients. The fixation type was unreamed intramedullary nail in 18, external fixation in 7, k-wire fixation in 6, and plating in 3. The other 13 patients had irrigation and debridement and a back slab as their initial surgery, and the definitive fixation was carried out as a second operation. Of the whole group of 47 patients, 19 (40%) underwent a surgical fixation of other skeletal injuries and 8 (17%) patients underwent surgery for other system injuries including laparotomy in 3, skin graft in 2, supra-pubic catheter in 2, and tendon repair in one. Prophylactic antibiotics were used in all patients for a mean duration of 13 (3-90) days. Fracture site infections occurred in 3 (6%) patients at a mean of 15 (5-29) days after the initial trauma. The diagnosed was reached by clinical signs and symptoms of infection in all 3 patients. Laboratory findings included a high white blood cell (WBC) count in all 3 patients, and identification of organisms isolated from the fracture site in 2. One patient had *E. coli* 12 days from trauma. One patient (28-year-old) was treated 19 hours after injury with an external fixator. His infection was treated by appropriate antibiotics, and he needed multiple debridement followed by flab coverage and he was cured. Another patient (17-year-old) was diagnosed 25 days after the initial injury with actinobacter and *Streptococcus* viridans infection. He had an IIIB open fracture that was derided within 6 hours from the initial injury and fixed with an external fixator. His infection was controlled with antibiotics and multiple debridement. There was no correlation between the infecting organisms and the swab taken from the tibia after the first debridement. None of these patients developed chronic osteomyelitis. The mean follow-up period in 47 patients was 66 (2-200) weeks. For the 40 (85%) patients who were not lost to follow-up, fracture healing was achieved by 4 (2-8) menthes. Thirty-five (88%) of those patients were completely cured and were able to go back to pre-injury functional status. Five (12%) had poor outcome because of knee and ankle stiffness, head injury, and delayed union. There was no statistically significant difference in the demographic date, severity of injury, duration until initial treatment, or the use of antibiotics between those patients who developed infection and those who did not. No single factor could be associated with the development of fracture site infection.

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Atheromatous disease and latent prostate cancer. *A correlation or a coincidence*

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The relationship between atheromatous disease (AD) and prostate cancer (PC) is of particular

complexity. However, there is some evidence that several factors already proven to promote atheromatosis, could possibly increase the risk of PC. While several studies have proposed (at least theoretically), various associations between prostate carcinoma and AD, mainly focusing in etiological and pathophysiological factors, autopsy studies providing rigid evidence in more quantitative terms between the 2 entities are scarce.

The present study investigates the relation between AD and the presence of PC in autopsy specimens. The material of our study, were 100 men between 40 and 98 years of age, who died in the period of August 2003-August 2005. The initial segment of the aorta, the prostatic gland, and the seminal vesicles of all cadavers were removed, sectioned and underwent pathologic examination. The macroscopic extent and distribution of atheromatous lesions was recorded from the autopsy protocol, while the diagnosis of PC and AD were obtained from the pathologic examination. Extension and distribution of atheromatous lesions was classified in 5 distinct topographic patterns according to areas affected: pattern 1 (involvement of coronary arteries), pattern 2 (involvement of aortic arc), pattern 3 (involvement of visceral ramous of ventral aorta), pattern 4 (involvement of peripheral segment of ventral aorta), and pattern 5 (combination of 2 or more types). According to disease severity, atheromatic lesions were classified histologically in early (types I, II, III) and advanced (types IV, V, VI). In addition to the detection of PC among the specimens, we also recorded the histological differentiation of carcinomas, using the criteria of the Gleason grading system. Patterns 1 and 5 of AD were the most common among our population study. Sixty-nine out of 100 men had pathological findings suggesting advanced AD (Type IV, V, VI lesions). Regarding the individual pattern of AD in men with concomitant PC, 5 (27.7%) had pattern 1, 4 (22.2%) had pattern 2, 1 (5.5%) had pattern 3, 2 (11.1%) had pattern 4, and 6 (33.3%) had pattern 5. Prostate carcinoma was detected in 18 specimens, while in 14 of them there was evidence of advanced AD in the pathologic examination. Although the relation found between PC and the presence of atheromatosis was of statistical significance ($p<0.05$), both parametric and non-parametric analysis did not also confirm a statistically significant correlation between the severity of AD and PC differentiation ($p>0.05$). The link between our observations and the responsible factors, at which such correlation could be attributed, remains unclear. Various theories along with current epidemiological evidence, suggest that a common underlying etiopathogenetical mechanism could be responsible for the initiative processes and progression of both entities. Indeed, clinical detection rates of both diseases show a wide geographical variation, being higher in "Western" societies, and substantially lower in Asian countries.[1] In addition, immigrants who moved from low-risk areas to the United States (US), gradually assumed the higher risk of the US population.[2] Therefore, several authors suggested that different dietary patterns (and especially the dietary fat content) may contribute to the differences in incidence and mortality rates of both diseases. Moreover, while the role of high fat diet in the pathogenesis of cardiovascular disease (CVD) is well documented, opinions on its association with PC are controversial. Several studies found a relationship between high dietary fat and increased PC risk,[3] while recent studies suggested that reducing the risk of CVD via cholesterol lowering therapy with statins, could also reduce the risk of PC.[4] Although such findings along with our observations seem to add more evidence in the association between the 2 diseases, the fact that both are very common in men as they age, makes it difficult to determine whether the coexistence of AD with PC is a correlation or a coincidence and further studies are needed in order to confirm such associations.

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