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Sadržaj

Riječ urednika

Poštovane kolegice i kolege, dragi čitatelji,

zadovoljstvo mi je predstaviti vam novi broj Acte Chirurgice Croatice, službenog časopisa triju društava Hrvatskoga liječničkog zbora (Hrvatsko kirurško društvo, Hrvatsko društvo za dječju kirurgiju i Hrvatsko društvo za endoskopsku kirurgiju). Naš osnovni cilj je poticanje edukacije i razmjene iskustava među sustručnjacima, a budući da je kirurgija grana medicine koja se neprestano razvija i napreduje, izuzetno je važno pratiti moderne tokove i dostiguća tehnologije koja svakim danom imaju sve veći utjecaj na naš rad. Riječ kirurgija temelji se na grčkoj riječi χειρουργική cheirourgikē koja znači „rad rukom", što upućuje na važnost vještine i preciznosti kirurga. Zato uredništvo Acte Chirurgice Croatice još jednom naglašava potrebu objavljivanja radova, pisanjem i čitanjem kojih ćete napraviti korak više u vlastitom stručnom usavršavanju.

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Prikazujemo i osvrt na stručni skup u Gospiću koji je Hrvatsko kirurško društvo u svibnju ove godine organiziralo u suradnji s Općom bolnicom Gospić. Kombinacijom različitih tema, od kirurških do pravnih, trudili smo se predstaviti zanimljiv i koristan niz problematika vezanih uz razne kirurške djelatnosti. Drago mi je da su se sudionici odazvali našem pozivu i vjerujem da će se takva druženja nastaviti.

Siguran sam da će ovaj broj Acte Chirurgice Croatice biti korisno i informativno pomagalo u vašem radu, kao i mjesto na kojem možete prikazati makar dio vlastitog iskustva koje je neprocjenjivo pacijentima te sadašnjim i budućim specijalistima svih podgrana kirurgije.

Prof. dr. sc. Mate Majerović
Predsjednik Hrvatskoga kirurškog društva

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TRANSPLANTACIJA JETRE U DJEČJOJ DOBI U HRVATSKOJ

Skraćeni naslov: Transplantacija jetre u dječjoj dobi u Hrvatskoj

Marko Bogović, KBC Zagreb – Tim za transplantaciju jetre

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Sažetak

Transplantacija jetre je danas terapija izbora u liječenju krajnjih stadija bolesti koje dovode do zatajenja jetre. Prva transplantacija jetre u djece u Hrvatskoj izvedena je u rujnu 2001. godine. Od tada do danas učinjeno je šesnaest transplantacija. Imali smo deset dječaka i šest djevojčica u dobi od 10 mjeseci do 16 godina. Najčešća indikacija za transplantaciju bila je atrezija žučnih vodova. Jednogodišnje preživljenje nam je iznad 80%, a period praćenja od 4 mjeseca do 9 godina. U ovom radu prikazujemo naše rezultate i kratak osvrt na povijest i sadašnju situaciju transplantacije jetre u dječjoj dobi.

Ključne riječi

jetra, transplantacija, bilijarna atrezija

Uvod

Postoji nekoliko ključnih trenutaka i osoba vezanih uz transplantaciju jetre. Prva je Thomas E. Starzl, koji je najviše pridonio da transplantacija jetre od eksperimentalnog postane standardni postupak u liječenju bolesti jetre (prvu transplantaciju izveo je 1963. godine). Drugi trenutak su rane osamdesete i razvoj imunosupresivne terapije (ciklosporin) što je značajno pridonijelo preživljenju (od 30% na više od 60%) te otvaranju i razvoju brojnih transplantacijskih centara. Danas uz napredak tehnike i nove imunosupresivne terapije preživljenje doseže 90% u iskusnim centrima kod elektivnih pacijenata. Manjak odgovarajućih kadaveričnih donora u početku je bio razlog za visoku smrtnost na listi čekanja, ali ona je smanjena razvitkom i usvajanjem novih tehnika za reduciranje ili podjelu grafta i razvojem transplantacije dijela jetre sa živog donora. Najčešće je to lijevi lateralni režanj, odnosno II. i III. segment, a kod jako male djece, kako bi se dobio presadak odgovarajuće veličine, rade se i monosegmentalne transplantacije. Najčešća indikacija za transplantaciju u dječjoj dobi je atrezija žučnih vodova, a iako su postojala razmišljanja da transplantacija bude primarni zahvat, postoji konsenzus da primarni zahvat bude portoenterostomija po Kasaiju, nakon koje u slučaju neuspjeha slijedi transplantacija. Transplantacija je također indicirana i za neresektabilne hepatoblastome bez udaljenih metastaza. Postignut je i značajan napredak u preoperacijskoj pripremi, u kontroliranju portalne hipertenzije kako bi djeca bila transplantirana u optimalno vrijeme. Anestezijološko vođenje postupka (krvarenje, smanjenje venskog priljeva, anheptička faza i ključna faza uključivanja nove jetre u krvotok i kontrola posljedične hiperkalemije) ključan je faktor uspješne transplantacije. Za djecu je također vrlo važno uvođenje takrolimusa, zbog manjeg nepovoljnog utjecaja na rast i razvoj djeteta. Dobro je poznata štetnost dugotrajne imunosupresivne terapije na kvalitetu života i očekivani životni vijek, stoga imunosupresivna terapija konstantno napreduje, razvijaju se manje nefrotoksični lijekovi, strategije ukidanja kortikosteroidne terapije i monoklonska protutijela, pa čak dolazi i do potpunog ukidanja imunosupresivne terapije (opisano u pojedinih bolesnika s transplantiranim bubregom) što sve dovodi do poboljšanja kvalitete života i njegovog produljenja.

Naši rezultati

Kao što je gore spomenuto, prva transplantacija jetre u djece u Hrvatskoj učinjena je u rujnu 2001. Dječak je bolovao od atrezije žučnih vodova, a donor lijevog lateralnog režnja bio je dječakov otac. Od tada je izvedeno 16 transplantacija i jedna retransplantacija. Naš standardni postupak je „piggy-back" tehnika, hepatikojejuno anastomoza, koristimo Wisconsin otopinu za prezervaciju i albumine za ispiranje, a imunosupresivni protokol sastoji se od kortikosteroida i takrolimusa. Djeca su bila u dobi od 10 mjeseci do 16 godina, 10 dječaka i 6 djevojčica. Najčešća indikacija za transplantaciju bila je atrezija žučnih vodova, ukupno 5. Kod sve djece s atrezijom inicijalno je učinjena portoenterostomija po Kasaiju. Ostale indikacije bile su po dva puta cista koledohusa i nedostatak alfa-1 antitripsina te po jednom kriptogena ciroza jetre, PFIC tip I, Alagilleov sindrom, kronični B hepatitis, fulminantni hepatitis, neonatalni hepatitis i sindrom Crigler-Najjar tip I. Imali smo 8 kadaveričnih i 8 živih donora. Ukupno 13 presadaka bilo je reducirano, a tri su bile cijele jetre. Treba napomenuti da je od živih donora jedan bio nesrodan djetetu, a da je jedan srodni bio ABO inkompatibilan. Kirurške komplikacije, odnosno indikacije za ponovnu kiruršku intervenciju, bile su krvarenje, stenoza ili tromboza anastomoze (vaskularna ili biliodigestivna), formiranje biloma, subfrenični apsces, empijem i opstruktivni ileus.

Naši rezultati su nakon krivulje učenja (edukacija osoblja, donorski zahvati, uključenje u Eurotransplant) usporedivi s rezultatima u recentnoj literaturi, a praćenje naših pacijenata je od 4 mjeseca do 9 godina. Posebnost našeg centra je što osim anesteziološke i pedijatrijske potpore u kirurškom timu rade iskusni dječji hepatobilijarni kirurg te vaskularni i plastični kirurg tako da se zajedničkim naporima priprema, sam zahvat i poslijeoperacijski period izvode na najvišoj mogućoj razini.

Zaključak

Od prve transplantacije jetre prošlo je gotovo 50 godina i u tom vremenu je transplantacija jetre od eksperimentalnog postala standardni postupak u liječenju krajnjih stadija bolesti jetre dok nove tehnike uzimanja grafta (split-liver) povećavaju broj donora i smanjuju listu čekanja (i smrtnost na njoj), a napredak u imunosupresivnoj terapiji dovodi do poboljšanja kvalitete i očekivanog životnog vijeka pacijenata.

Ime	PACIJENTI Dob	Spol
L. L.	9 mjeseci	m
M. M.	10 mjeseci	ž
M.M.	7 godina	ž
K. S.	4 godine	ž
M. M.	3 godine	ž
I.M.	10 godina	m
S. D.	15 godina	m
Z. S.	10 godina	m
M. G.	10 godina	m
L.J.	3 godine	m
A. G.	2 godine	m
T. Ć.	3 godine	m
M.L.	16 godina	m
H.N.	10 mjeseci	ž
S.B.	16 godina	m
E.T.	1 godina	m

INDIKACIJE	
atrezija žučnih vodova	5
cista koledohusa	2
nedostatak alfa-1 antitripsina	2
kriptogena ciroza jetre	1
Alagilleov sindrom	1
kronični B hepatitis	1
fulninatni hepatitis	1
neonatalni hepatitis	1
PFIC tip I	1
sindrom Crigler-Najjar tip I	1

KOMPLIKACIJE	
krvarenje	2
stenoza ili tromboza anastomoze	2
bilom	1
subfrenični apsces	1
empijem	1
opstrukcijski ileus	1

TIP TRANSPLANTACIJE
10 segmentalnih (II. i III. segment)
3 lijeva režnja
3 cijele jetre

DONORI
8 kadaveričnih
8 živih donora

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SIMULTANEOUS SURGERY FOR ABDOMINAL AORTIC ANEURYSM AND CONCOMITANT SEMI-MALIGNANT TUMOR OF THE ABDOMINAL WALL

Running head: Simultaneous Surgery for AAA and DFSP

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Keywords

dermatofibrosarcoma protuberans, abdominal wall, abdominal aortic aneurysm, simultaneous surgery

Ključne riječi

dermatofibrosarcoma protuberans, abdominalna stijenka, aneurizma abdominalne aorte, simultana operacija

Introduction

Most often the accidental findings during the abdominal aortic aneurysm (AAA) surgery are cholelithiasis, inguinal hernia, gastrointestinal cancer, renal and retroperitoneal tumors, while concomitant mesenchymal tumors are rare. Associated lesions increase the operative risk and bring into focus the question of simultaneous or staged approach [1]. As related series of patients, reported in literature, are small and results diverse, there is not enough evidence to establish reliable treatment protocols. Here we present a situation where the AAA was discovered during the diagnostic evaluation of a protuberant cutaneous malignancy of the abdominal wall. Some considerations regarding operative technique and strategy are discussed [2].

Case report

A 63-year-old male was referred to our department because of the large abdominal wall tumor and concomitant symptomatic AAA, as confirmed by ultrasound (US) exam performed in the course of the diagnostic evaluation of the tumor.

The tumor was located in the suprapubic region, measuring 10 x 9 x 6 cm. It was an exophytic mass with lobulated texture and grey-white cut surface, firm and elastic on palpation (Fig.1). Preoperative excisional biopsy was taken. Histologically, the tumor was located in reticular dermis and subcutis and consisted of spindle and fusiform cells arranged in short fascicles that formed a storiform pattern (Fig.2). Tumor cells were monotonous and small but some cells showed moderate pleomorphism. The mitotic count ranged from 3 to 8 mitoses / 10 high power fields. There was no

necrosis. Immunohistochemically, the tumor cells showed expression for vimentin and CD34 (Fig.3), but were negative for desmin and S-100 protein which was consistent with the diagnosis of semi-malignant dermatofibrosarcoma protuberans (DFSP).

Multi-slice computed tomography (MSCT) revealed cuticular and subcuticular tumor invasion in the suprapubic region of the abdominal wall, not involving the muscle layer. The infrarenal abdominal aortic aneurysm (Fig.4) was found to be 71 mm in diameter. In consultations with the specialist for plastic and reconstructive surgery and the oncologist, the decision was made for simultaneous surgery of the abdominal wall tumor and the AAA.

The tumor was excised in general anesthesia by transverse elliptic incision with 2 cm free tumor margins, deepened to the muscle fascial layer. The anterior fascial sheath of the left rectus muscle was also excised. After the removal of the tumor, another set of instruments was prepared, and operative clothes coverings and gowns were changed. The infrarenal aneurysm was approached by full pubic to xyphoid abdominal incision, with the "Z" incision in the upper part of the wound (Fig.5, Fig.6). The AAA was resected and reconstructed with Intervascular straight silver graft, 24 mm in diameter (Fig.7). The resected part of the rectus muscle sheath was reconstructed with polypropylene mesh.

In the postoperative period there was sparse marginal necrosis and minimal serous secretion from the caudal part of the wound which was treated conservatively by changing dressings few times a day (swab cultivation showed Candida albicans and Staphylococcus epidermidis). After 23 days the patient was discharged with instructions to repeat chest, spine and pelvis X-rays, abdominal US and CT, aminotranspherases, alkaline phosphatase, urea, creatinine and blood sugar, followed by a surgical and an oncological exam two weeks after the procedure, and then in monthly intervals. There was no evidence of malignancy recurrence within 10 months of follow-up.

Discussion

Sarcomas are the most frequent malignant abdominal wall tumors, usually presenting as slow-growing painless masses. The treatment of these tumors usually requires radiotherapy and aggressive resection [3, 4], which necessitates abdominal wall reconstruction [5]. Therefore, preoperative planning based on precise evaluation of the tumor size and extension is essential.

DFSP is an uncommon, locally aggressive skin and soft tissue tumor, prone to recur locally following excision, but rarely gives far metastases [6].

A combination of a malignant tumor of the abdominal wall and an AAA is a peculiar and rather complex case. There are no established algorithms for the treatment of such concomitant lesions. In the lack of well designed studies, one should apply an individualized approach and common medical sense. Priority should be given to the lesion that presents a greater threat to the patient [1].

A malignancy should be resected first if the risk of the AAA rupture is low (asymptomatic aneurysm, diameter less than 5 cm). On the other hand, a large symptomatic AAA requires immediate reconstruction. However, postponing the tumor resection for the second stage procedure gives the tumor time to spread locally and metastasize. Simultaneous procedure should be considered if both lesions are complicated or symptomatic [1], weighing on the patient's general condition, comorbidity and relative risks and benefits of the simultaneous treatment.

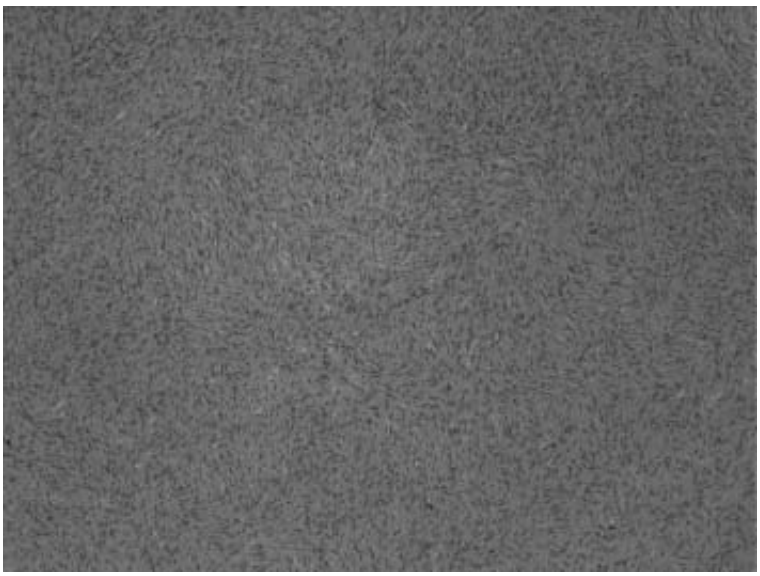
There are several concerns in performing simultaneous surgery of the AAA associated with a malignancy. Prolonged operating time increases the risk of perioperative infections. Although closing of the abdominal wall with the autologous tissue is a priority to lower the risk of postoperative infections, fascial repair can contribute to the increase of the intra-abdominal pressure (IAP), especially when the excision of the abdominal wall is large, which facilitates the development of the abdominal compartment syndrome, following simultaneous AAA resection. Resection margins must be wide enough because the likelihood of the local control associated with this procedure exceeds 75% if resection margins are greater or equal to 2 cm [4, 6]. However, leaving a malignancy in the abdominal cavity or wall for a second stage operation increases the risk of tumor progression. Using the techniques of reconstructive surgery, one can alleviate some of the drawbacks of the simultaneous approach. The component separation technique provides midline fascial

advancement of 10 cm in epigastrium, 20 cm at the waistline, and 6 cm at the suprapubic area when separated bilaterally (Ramirez 1990). If this is not enough, a polypropylene mesh can be used for abdominal wall reconstruction. In cases as complex as the one described, a team approach should be employed, involving a vascular surgeon, a plastic surgeon, a pathologist and an oncologist, in order to choose the optimal treatment. Simultaneous procedure was chosen in this particular patient, taking into account the aneurysm size and tumor type and extension. Although we did not find a similar citation in literature, this case might contribute to unraveling the appropriate operative strategies for such concomitant lesions.

Figure legends

Fig. 1. Macroscopic appearance of protuberant dermatofibrosarcoma (the photograph was taken after performing preoperative biopsy specimen)

Fig. 2. Storiform histological pattern is a common feature of dermatofibrosarcoma protuberans (hematoxylin and eosin staining)



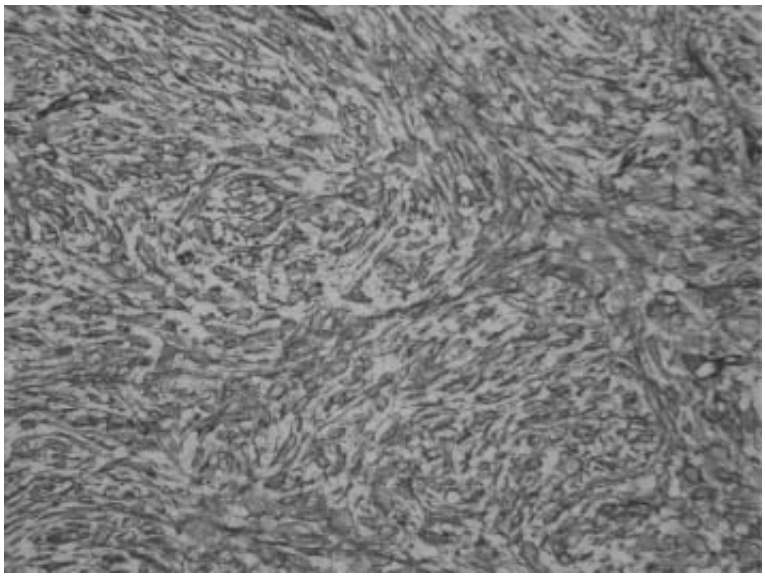


Fig. 3. Tumor cells exhibiting strong cytoplasmic immunoreactivity for CD34 (hematoxylin counterstain)

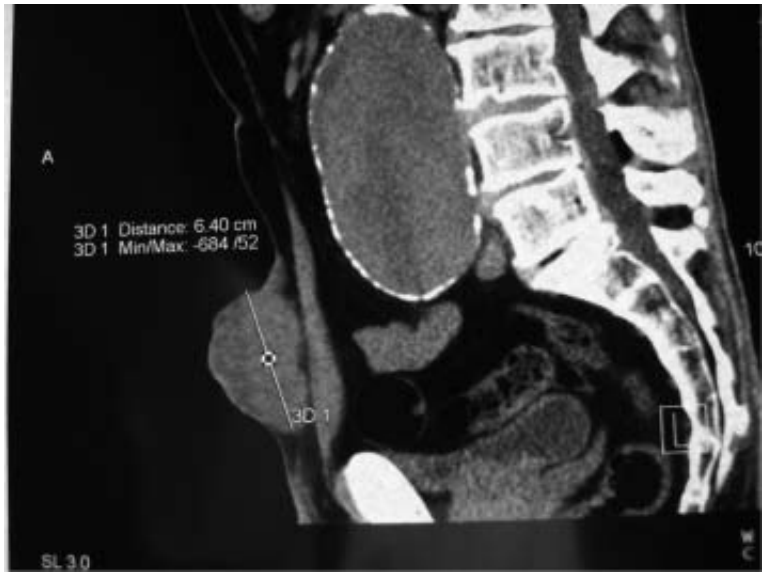


Fig. 4. MSCT-scan showing cuticular and subcuticular tumor invasion and the infrarenal AAA

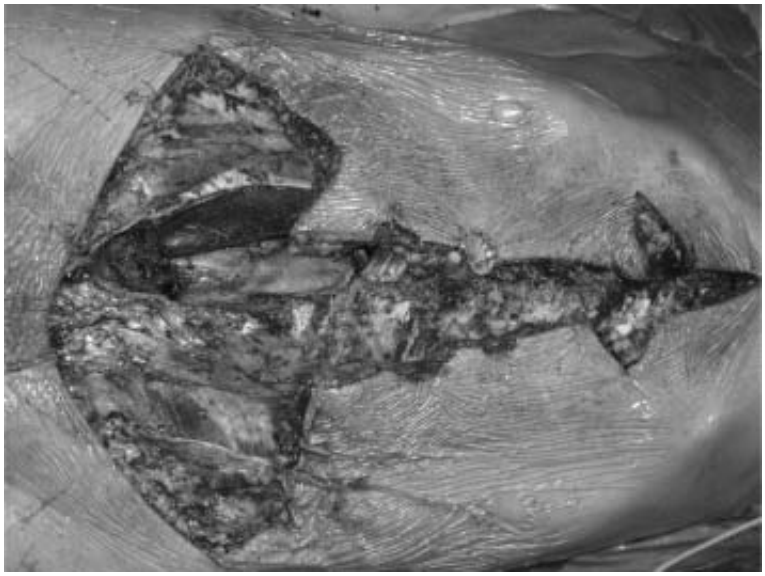


Fig. 5. Abdominal incision

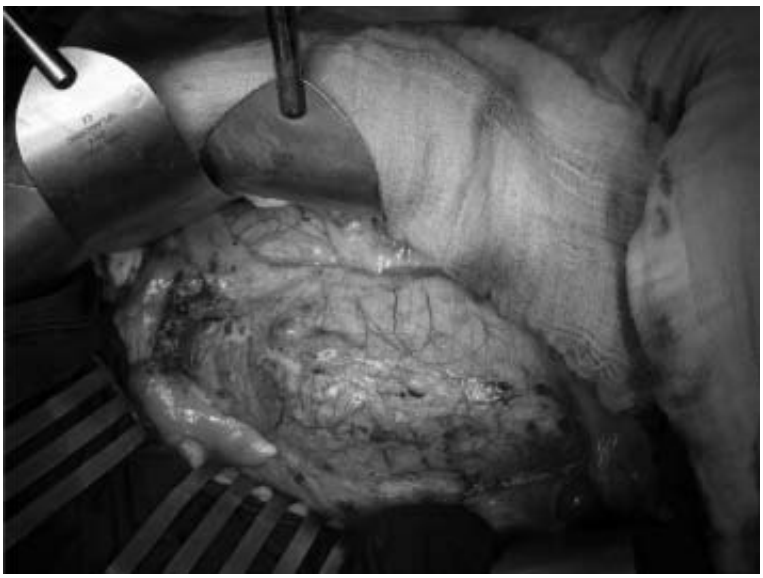


Fig. 6. Infrarenal AAA in situ, before resection

Fig. 7. Tube graft situated in place of the previously resected aneurysm

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DE GARENGEOT HERNIA – CASE REPORT

Running head: De Garengeot Hernia

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Abstract

Femoral hernias are less common than inguinal and are more often found in females. The French surgeon Rene Jacqes Croissant de Garengeot was the first one to describe the appendix in the femoral hernia sac. We present our case report: a 73-year-old woman with incarcerated right femoral hernia and strangulated appendix vermiformis. The patient underwent emergency surgery; appendicectomy and hernia repair was done. We present this case because of its rarity.

Keywords

hernia, femoral hernia, appendicectomy

Introduction

Femoral hernia occurs in 2%-4% of patients with groin hernia and mostly in female population [1]. Many intraabdominal organs can be in the hernial sac; like sygma, omentum, cecum, small bowel or appendix [2]. In every patient there is risk of incarceration of hernial sac and strangulation of hernial content [3]. Most patients undergo a hernioplasty operation, as an elective surgical procedure, but there are still some patients with incarceration and complications of femoral hernia.

Case Report

A 73-year-old woman presented with a right-sided swelling groin pain of 5-day duration. She had no history of previous hernia or trauma. On examination we found a right inguinal swelling (4 x 3 cm) lateral to the pubic tubercle. An ultrasound was performed, with evidence of fluid collection. Also, we performed an abdominal x-ray, but it was without pathological findings. On the laboratory assays she had mild leukocytosis (12 x 109) and an elevated level of CRP (54 mg / L). Because of these clinical findings, on the day of admission our patient underwent emergency exploration surgery. In general anesthesia we performed an oblique groin incision and identified the incarcerated femoral hernia. After opening the hernia sac, a gangrenous, strangulated appendix was found, with haematogenous fluid collection (Fig. 1, 2). After appendicectomy, we did the McVay hernioplasty with a resorptive suture. The postoperative recovery was uneventful and the patient was discharged home on the third postoperative day. Laboratory findings on the third postoperative day were within normal levels.

Discussion

There are some pathological conditions which cause groin mass: inflammatory processes, neoplasms, vascular conditions, congenital abnormalities and non-congenital hernias.

Femoral hernias are a rare condition and the appendix in the hernia sac is a very uncommon finding. Diagnosing the appendix in the hernia sac is very difficult, we can use ultrasound, which is a useful tool for the diagnosis of inguinal hernias [5, 6, 7], but most of them were discovered intraoperatively. CT or MRI imaging can also be useful in the diagnosis of femoral hernia [8]. The strangulation of the appendix is caused by tight femoral ring, but usually does not lead to abdominal peritonitis. Clinical signs are groin swelling, cellulitis and skin inflammation. An unrecognised inflammation can resolve or cause complications like abscess, necrotizing fasciitis, necrosis of hernial contents, bowel obstruction and even death. There are several options for treatment of De Garengeot hernia. If there are no signs of inflammation, hernioplasty with mesh can be performed after appendicectomy. In case of appendicitis, a better option is to perform one of the classical hernioplasties like McVay, Bassini etc. [9, 10]. Nowadays, we also have possibilities to make laparoscopic explorations of the abdominal cavity and perform laparoscopic hernia repairs [11].

Conclusion

It is very rare to find a strangulated, gangrenous appendix within a femoral hernia but this is a serious and potentially lethal complication. Early clinical diagnosis and surgical intervention are the best way to prevent all complications of this condition.

Figure 1.

Figure 2.

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CONGENITAL HYPERINSULINISM – SURGICAL TREATMENT AND COMPLICATIONS

Running head: Congenital Hyperinsulinism

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Abstract

Congenital hyperinsulinism is a common cause of persistent hypoglycaemia in neonates. Cases resistant to medicamentous therapy require surgical treatment, where the greatest challenge is to differentiate focal from diffuse forms of the disease and to localize the focal lesion. PET-scan, selective arterial stimulation and venous sampling (ASVS) and intraoperative frozen sections examination are used to determine the type. Partial pancreatectomy for focal forms has lower complication rate and diabetes mellitus development than radical near-total pancreatectomy for diffuse forms. We report a case of a 6-month-old boy with focal form of CHI with special emphasis on surgical complications of pancreas resection together with their management.

Keywords

hyperinsulinism, hypoglycaemia, pancreatectomy, partial pancreatectomy, choledochal obstruction, choledochal lesion

Introduction

Congenital hyperinsulinism is a common cause of persistent hypoglycaemia in neonates [1]. It occurs in 1:50000 live births. A defect in β-cell K-ATP channel leads to uncontrolled oversecretion of insulin causing resistant hypoglycaemia which, if not recognized and promptly treated, can cause permanent brain damage [2]. When episodes of hypoglycaemia cannot be medicamentously controlled, surgical treatment is considered. The greatest challenge for the surgeon is to differentiate focal from diffuse forms of the disease and to localize the focal lesion. Partial pancreatectomy for focal forms has a lower complication rate and diabetes mellitus development than radical near-total pancreatectomy for diffuse forms. The use of PET-scan and ASVS preoperatively and frozen sections examination intraoperatively gives the best results in the differentiation of these two types. We report a case of a 6-month-old boy with focal form of CHI, detected by the PET-scan and confirmed on intraoperative frozen sections, partial pancreatectomy was performed. He also developed two surgical complications in both early and late

postoperative period which were successfully solved. Current surgical options for CHI treatment, as well as surgical complications of pancreas resection together with their management, are reported here.

Case report

A 6-month-old boy with persistent neonatal hypoglycaemia was treated since birth at our pediatric department. The first symptoms of the disease were seizures observed in the early neonatal period. After work-up the diagnosis of CHI was made. Intensive medicamentous therapy could not maintain normal blood glucose levels so surgical therapy was considered. To determine whether it was a focal or diffuse form of the disease, PET scan using 18 F-L-DOPA (Picture 1) was performed and revealed an elevated pathologic activity in the projection of the head of the pancreas so we decided to perform a partial pancreatectomy. During the procedure the whole pancreas appeared normal and the tumor could not be macroscopically detected so we had to do eight intraoperative biopsies which guided us through the procedure. The head of the pancreas, uncinate processus and a part of the body were resected until the margins on the biopsy specimen came negative. It was followed by Roux-en-Y pancreaticojejunostomy. While excising the pancreatic head, we managed to preserve the choledochal duct (confirmed by intraoperative biligraphy taken through the cystic duct after cholecystectomy) (Picture 2). Guided by the pathologist, the resection had to be extended so we divided the pancreatic tissue from the area around papilla Vateri and ligated the main pancreatic duct. The pancreatic tissue within the C-loop of duodenum had also been removed and, although we were very careful, some of the duodenal external circulation was probably damaged and the duodenum seemed a bit livid at the and of the procedure.

The early postoperative period was very good, glucose levels were normal from the second day on without any medicamentous therapy. The first complication was observed when we started peroral nutrition. The patient developed signs of high (duodenal or jejunal) obstruction. Barium swallow excluded mechanical stop, and we assumed that the stop was functional and that the duodenum still hasn't recovered from partial devascularisation. On conservative therapy the symptoms completely resolved after two weeks.

Forty days after the procedure liver enzymes were found to be elevated with bilirubin at 30 μmol/L, the bile ducts were slightly dilated on ultrasound examination. Choledochal stenosis was suspected and with boy being well and with normal coloured stools, we decided to be expectative. Unfortunately, liver enzymes continued to grow (but not blood levels of bilirubin) with signs of hepatomegaly and by excluding other possible causes of liver lesion, choledochal stenosis had to be managed. Our first idea was to perform ERCP with stent placing through the papilla. On endoscopy performed by an experienced invasive gastroenterologist, papilla of Vateri was clearly shown and appearing normal but attempts to put a stent through it failed. With intrahepatal bile ducts up to 8-9 mm wide, an invasive radiologist perfomed PTCA and managed to put the tube into the confluens of the left and the right hepatic ducts, but the attempt to place it through the papilla also failed. After PTCA, however, the boy's condition improved, liver enzymes started to fall and liver growth stopped. At last, with high-output biliary fistula and with still unsolved biliary obstruction we decided to perform a surgical procedure. After adhesiolysis we found a dilated choledochal duct (about 1 cm wide) (Picture 3) and performed side-to-side choledocho-jejunal anastomosis with previously formed Roux limb. The postoperative period was without complications, blood levels of liver enzymes and bilirubin fell to normal values, and hepatomegaly resolved. Three months after the procedure the boy is at home and doing well.

Discussion

The greatest surgical challenge in the treatment of CHI is to separate diffuse from focal forms of the disease. These two forms cannot be differentiated by clinical or biochemical investigations. It has been shown during the last decade that the percentage of focal forms is significantly higher (>60%) than previously reported (20%). Subtotal and near-total pancreatectomy for diffuse forms and partial pancreatectomy for focal forms are the surgical options [3].

The PET scan and arterial stimulation with venous sampling give the best results in localising focal lesions preoperatively. Although very precise,

ASVS is a technically challenging procedure and should be limited to experienced radiologists and centres [4]. The PET scan can provide similarly good results and is a non-invasive method [5]. How can we be sure that we have removed the lesion by partial pancreatectomy? Inspection and palpation of pancreas has only about 60% accuracy in identifying the lesion even if performed by an experienced and highly specialized surgeon. A pathologist can differentiate, by examining intraoperative frozen sections, focal from diffuse forms, find the lesion and inspect the margins of the resected specimen [6, 7].

Combining these methods together with surgical experience is necessary to determine the extent of surgical resection, which results in a cure and prevents unnecessary hyperglycaemia or diabetes mellitus in later life.

Surgical resections of the pancreas (both partial and near-total), however, have several complications. Unfortunately, we have encountered two of them in our case.

The most probable cause of our first complication, partial, temporary duodenal obstruction, was a partial lesion of the external vascular supply – superior et inferior pancreatico-duodenal artery. After two weeks the symptoms resolved, that period was probably enough for intramural vascular supply to enhance and take over.

Biliary obstruction was the second complication and was solved as described above. We have recognized two possible pathologic mechanisms. While dividing the pancreatic tissue, the delicate vascularisation net of the choledochal duct can be damaged and ischaemia can lead to stenosis. The other point of surgical procedure where obstruction could take place was transection and ligation of the main pancreatic duct near papilla Vateri. Scar tissue that was formed later in that area could have caused stenosis. We assume both of these mechanisms caused obstruction in our case. It is hard to tell, with the intact choledochal duct, was it safer and possible to recognize these mechanisms and assume biliary stenosis and perform biliodigestive anastomosis at first operation to avoid complications.

In the end we would like to point out that surgical procedures on the pancreas are rare [8] in childhood, but when needed, careful planning, capability to solve possible complications and multidisciplinary management are obligatory to achieve success.

Figure 1. PET-scan revealing intense activity in the pancreatic head

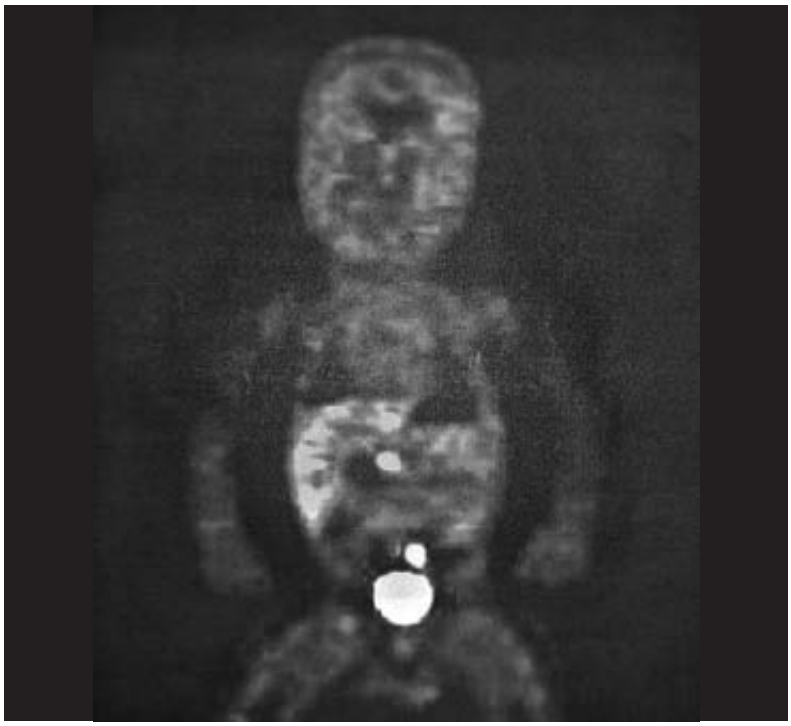


Figure 2. Intraoperative biligraphy taken through the cystic duct after cholecystectomy shows an intact choledochal duct

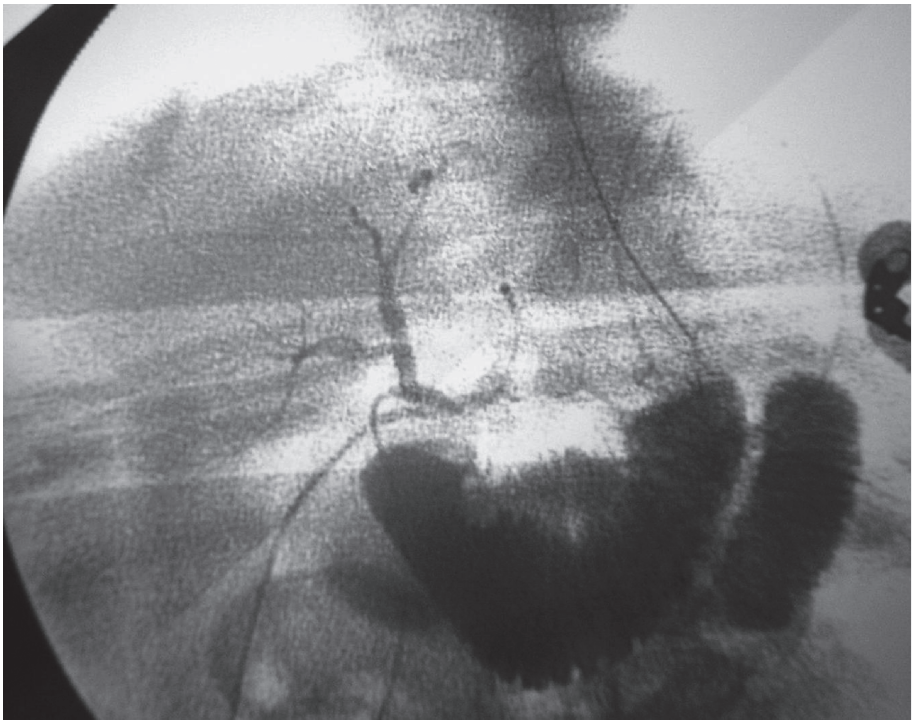
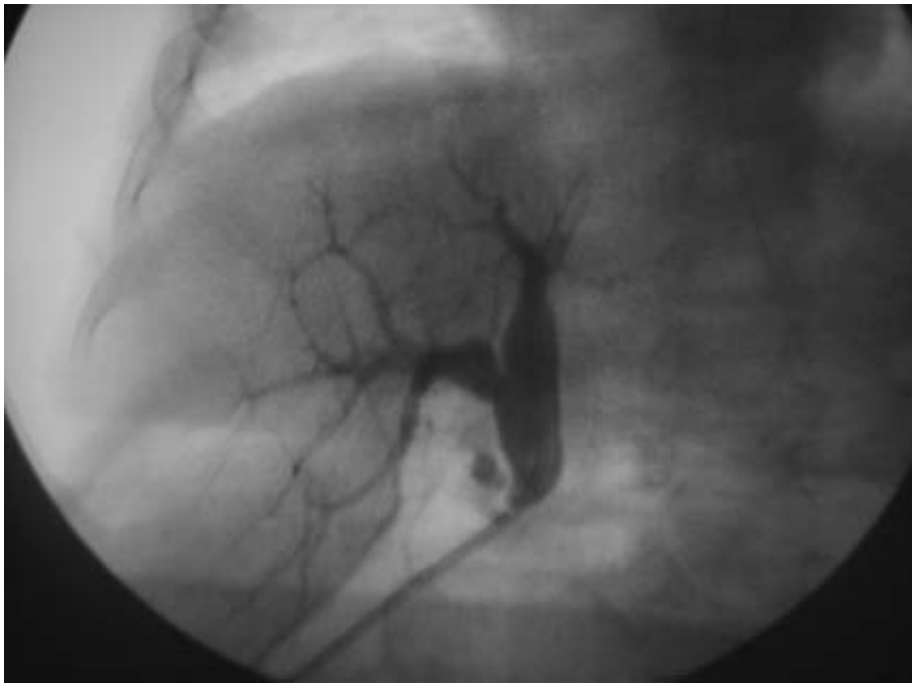


Figure 3. Intraoperative biligraphy taken through choledochotomy at second procedure shows dilated choledochal and intrahepatic bile ducts



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AORTIC VALVE ENDOCARDITIS: A LATE COMPLICATION OF A BLAST TRAUMA

Running head: Aortic Valve Endocarditis: A Late Complication of a Blast Trauma

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Keywords
infective endocarditis, blast trauma, aortic valve replacement, mitral valve repair

Ključne riječi
infektivni endokarditis, eksplozivna ozljeda, zamjena aortne valvule, rekonstrukcija mitralne valvule

Introduction

Despite advances in diagnosis and treatment, infective endocarditis remains a dangerous disease. If not aggressively treated with antibiotics combined or not with surgery, it may lead to severe morbidity as well as mortality [1]. The incidence remains similar due to a progressive change of risk factors. While classic predisposing conditions have not been eradicated, new risk factors include intravenous drug use, sclerotic valve disease in elderly patients, use of prosthetic valves, nosocomial disease, and hemodialysis patients [2].

Case Report

We report a case of a 55-year-old male patient, a war veteran with post-traumatic stress disorder, admitted for a new onset of fever, angina and dyspnea with no previous cardiac history. The patient's history revealed that two years prior to the current hospital admission he suffered from a blast trauma to the pelvis and the abdomen, causing penetrating injuries and multiple organ damage. This was followed by a series of reconstructive surgical procedures like rectal resection, cystostomy, multiple urethrotomies for urethral strictures, and abdominal drainage complicated with pneumonia and sepsis.

At present admission for the symptoms mentioned earlier, the initial echocardiography did not reveal any significant valvular pathology and hemoculture was negative. Empirical antibiotic therapy was started. Since the patient's clinical state was deteriorating with a progression of dyspnea, angina and fever, another echocardiography was performed. The latter examination revealed severe aortic regurgitation (AR) with a vegetation measuring 2 x 1.5 cm involving the left coronary cusp. In addition to his aortic valve pathology, the patient was found to have functional severe mitral regurgitation (MR). Enterococci were isolated from the blood and intravenous vancomycin and gentamycin were initiated. The progressive renal insufficiency prompted the substitution of the mentioned antibiotics with meropenem and linezolid. Further evaluation using abdominal ultrasound disclosed

an abscess of the spleen verified by a multi-slice computed tomographic (MSCT) imaging. Splenectomy was performed to prevent rupture and prosthetic valve endocarditis. A low platelet count was attributed to a side effect of linezolid observed after the onset of therapy. Neither enzyme-linked immunosorbent assay nor flow cytometry revealed anti-platelet or anti-heparin/platelet factor 4 antibodies. After ruling out coronary artery disease with a MSCT coronary angiography, the patient was referred to surgical management for his cardiac pathology.

The surgery was performed with the aid of cardiopulmonary bypass. The intraoperative findings were consistent with the preoperative ultrasound imaging (Fig. 1). Predominantly the left, as well as the right, coronary cusp was compromised with endocarditic vegetation that partially occluded the opening of the left main coronary artery (Fig. 2). After complete excision of the aortic valve cusps, the mitral valve was inspected. Mitral regurgitation was found to be secondary to P3 tethering. Mitral valve repair using an undersized annuloplasty ring and ultimately aortic valve replacement with a mechanical prosthesis were performed. The patient had an uneventful postoperative recovery.

Discussion

Pressure effect of blast injury damages organs, particularly at air-fluid interfaces, and the wind propels fragments of the device, causing penetrating or blunt injuries [3]. The extent of the damage to the tissue is utterly diverse and complications can vary to such an extent that it would be impossible to numerate.

Infective endocarditis is a disease in which a microorganism colonizes a focus in the heart, producing fever, heart murmur, splenomegaly, possibly embolic manifestations and bacteremia or fungemia. Embolic manifestations can vary from cerebrovascular accidents (CVA) to splenic abscess, as described in the case study. Early diagnosis of this condition is extremely important because it almost invariably leads to devastating complications and death if not treated with antibiotics, with or without surgery. Most study reports indicate that operative mortality is below 10%. This percentage rises in the at-risk population; a history of infective endocarditis, prosthetic valve endocarditis, congenital heart disease, etc. 10-year survival after surgery for infective endocarditis is about 50 to 60% [4].

Even more important than treatment is the prevention of infective endocarditis. Antibiotic prophylaxis at a time of invasive procedures has been a tenet of cardiac and dental practice for half a century, although the evidence of benefit is limited. The shortage of evidence and changing clinical profile of infective endocarditis has led several health organizations to update their guidelines in recent years [5]. In patients with underlying cardiac conditions associated with the highest risk of adverse outcome from infective endocarditis, prophylaxis for dental procedures may be reasonable, even though its effectiveness is unknown [6]. Additional prophylactic measures for infective endocarditis include education of at-risk patients about the need for meticulous dental and skin hygiene and avoidance of unnecessary invasive procedures. A strict adherence to institutional hygiene is crucial because a third of cases of prosthetic valve or S. aureus infective endocarditis are nosocomial in origin and mortality in this setting exceeds 30% [7, 8].

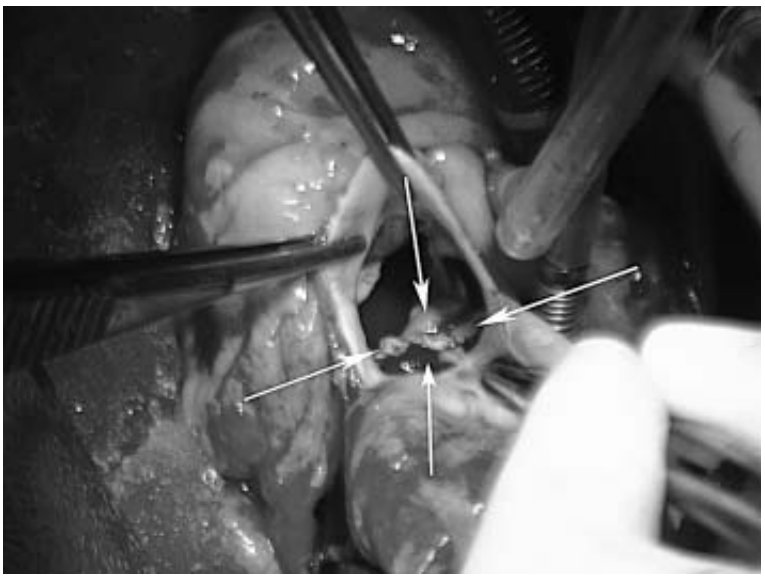
In the setting of such a complex case, with diverse comorbidities, a successful surgical treatment was performed. Nevertheless, the patient was also adequately treated in the early postoperative period at our department. As in all of our patients, a fast track postoperative management protocol was initiated. Once desirable findings were obtained, including echocardiography, the patient was released from our department with an emphasis to continue i.v. antibiotic therapy, according to the recommendations for treating infective endocarditis. Recently, at the early follow-up examination two months after the surgery all findings have suggested that the treatment was successful and that there was no recurrence of the illness.

We consider the adequate management protocol should be as described in our case study, i.e. 6 week targeted i.v. antibiotic therapy, surgical intervention, edema control and long term echocardiographic follow-up to identify possible late prosthetic valve endocarditis.

Figure captions

Figure 1. Short axis view of the aortic valve using a transesophageal ultrasound showing an impressive vegetation involving the left coronary cusp of the aortic valve (AV - aortic valve, RV outflow - right ventricular outflow tract, LA - left atrium, RA - right atrium)

Figure 2. Intraoperative photograph of the aortic valve
The arrows point towards the vegetation that extends over the whole left coronary cusp and to some extent the right coronary cusp. It is partially occluding the opening of the left main coronary artery.



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SURGICAL TREATMENT OF MITRAL VALVE PARAVALVULAR ABSCESS IN A PATIENT UNDERGOING CHRONIC HAEMODIALYSIS – CASE REPORT AND REVIEW OF LITERATURE

KIRURŠKO LIJEČENJE PARAVALVULARNOG APSCESA U BOLESNIKA NA HEMODIJALIZI – PRIKAZ SLUČAJA I PREGLED LITERATURE

Running head: Paravalvular Abscess of Mitral Valve

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Abstract

Introduction:

Infective endocarditis is more common in patients on chronic haemodyalisis than in the general population and constitutes the second most common cause of death in this group.

Mitral valve paravalvular abscess is a serious complication of infective endocarditis which predicts future complications.

Case report:

A 53-year-old female patient was admitted in our institution for surgical treatment of mitral insufficiency and coexisting formation in the left atrium with a great risk of embolization. The patient had been treated by haemodialysis for end-stage renal disease due to diabetic nephropathy. TEE revealed a callosity located near the posterior mitral cusp, with a cavity in its centre. Surgical exploration revealed the existence of an abscess cavity filled with purulent content, encapsulated, restrained from the surrounding tissue in the posterior part of the mitral anulus. Aggressive debridement of the abscess cavity and involved tissue was performed. After that, a mitral biological prosthesis was implanted. Enterobacter spp. was isolated from the operative specimens.

Annular defect after debridement can be reconstructed by a pericardial patch (fresh autologous pericardium, glutaraldehyde fixed pericardium or Dacron fabric) or the tissue of the left atrial appendage.

Conclusion:

The presence of a paravalvular abscess as a complication of IE significantly increases the complexity of surgical treatment and leads to increased mortality. The basic principle of surgical treatment of mitral valve paravalvular abscess is

aggressive debridement and resection of the infected tissue.

Sažetak

Cilj:

Infektivni endokarditis (IE) mnogo je češći u bolesnika na kroničnoj hemodijalizi nego u općoj populaciji i drugi je najčešći uzrok smrti u ovoj skupini. Paravalvularni apsces mitralnog zaliska ozbiljna je komplikacija infektivnog endokarditisa koja predskazuje buduće komplikacije.

Prikaz slučaja:

Žena u dobi od 53 godine primljena je u našu ustanovu radi kirurškog liječenja mitralne insuficijencije i postojeće tvorbe u lijevom atriju s velikim rizikom od embolizacije. Bolesnica je liječena hemodijalizom zbog terminalne bubrežne insuficijencije uzrokovane dijabetičkom nefropatijom. Transezogealnom ehokardiografijom utvrdilo se zadebljanje blizu posteriornog mitralnog kuspisa sa šupljinom u središtu.

Kirurškom eksploracijom utvrdilo se postojanje apscesne šupljine ispunjene purulentnim sadržajem, inkapsulirane, ograničene od okolnog tkiva u stražnjem dijelu mitralnog anulusa. Učinjen je opsežni debridman apscesne šupljine i zahvaćenog tkiva. Nakon debridmana ugradila se biološka mitralna proteza. Iz intraoperativnih uzoraka izoliran je Enterobacter spp. Anularni defekt nakon debridmana može biti rekonstruiran perikardijalnom zakrpom (svježi autologni perikard, u glutaraldehidu fiksiran perikard ili Dacron) ili tkivom apendiksa lijevog atrija.

Zaključak:

Prisutnost paravalvularnog apscesa kao komplikacije IE značajno povećava kompleksnost kirurškog liječenja i doprinosi povećanom mortalitetu. Osnovni princip kirurškog liječenja je agresivni debridman i resekcija tkiva zahvaćenog infekcijom.

Introduction

The number of patients undergoing chronic dialysis is significantly increasing every year. Infective endocarditis is more common in these patients than in the general population and constitutes the second most common cause of death in this group.

Perivalvular spreading of infection leads to local complications, including paravalvular abscess. Paravalvular abscess is a serious complication of infective endocarditis that predicts a higher mortality rate, more frequent development of congestive heart failure and higher frequency of following surgical treatment.

We present a case of an intraoperatively established paravalvular abscess in a chronically haemodialysed patient.

Case Report

A 53-year-old female patient was admitted in our institution for surgical treatment of mitral insufficiency and coexisting formation in the left atrium with a great risk of embolization. The patient had been treated by haemodialysis for three previous years, three times per week, for end-stage renal disease due to diabetic nephropathy. Her relevant medical history included arterial hypertension, diabetes mellitus and hypothyroidism.

Transesophageal echocardiography (TEE) revealed a callosity, size 3 x 1 cm, located near the posterior mitral cusp, with a cavity in its centre. On the atrial side of this formation was a floating structure 1.4 cm in length and several milimeters in width. A moderate mitral insufficiency because of the posterior mitral cusp prolapse was also revealed. Coronary angiography was also performed and revealed significant stenosis of proxymal and medium segments of the right coronary artery. Sinus rhythm was on ECG. During the patient's stay in our institution her body temperature was normal.

During the surgery, the approach was median sternotomy and cardiopulmonary bypass was used. Myocardial protection was achieved with the use of anterograde and retrograde cold blood cardioplegia. Mitral valve was exposed through left atriotomy. Surgical exploration revealed the existence of the abscess cavity filled with purulent content, encapsulated and restrained from surrounding tissue (Figure 1.).

Specimens for microbiological analysis were taken. Aggressive debridement of abscess cavity and involved tissue was performed. The anterior and a part of the posterior mitral cusp were

excised. After debridement, mitral biological prosthesis (Medtronic Mosaic 29 mm) was implanted. Coronary artery bypass grafting was also performed (right coronary artery with saphenous vein graft). Because of intraoperative findings, antimicrobial therapy with vankomycin was started immediately in the ICU. Her ICU stay was 5 days. Enterobacter spp. was isolated from the operative specimens. Because of that, meropenem was also introduced in antimicrobial therapy. Antimicrobial therapy was continued for 6 weeks following surgery. The patient had an uneventful postoperative course.

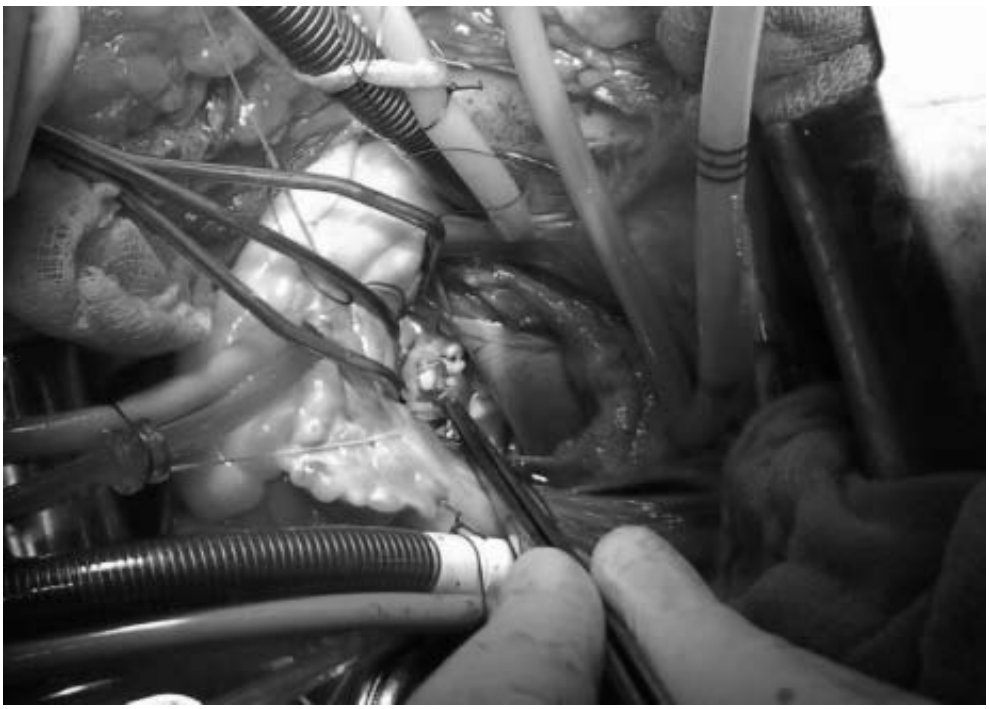

Figure 1. Abscess cavity in the posterior part of anulus of mitral valve

Discussion

Infective endocarditis (IE) is an infection of the endocardial surface of the heart. Despite improvements in diagnosing and treating IE, the mortality rate has been stable for the past several decades at 20%. Perivalvular spreading of infective endocarditis leads to perivalvular complications (abscess, fistula, pseudoaneurysm). Annular and periannular abscesses are more common on the aortic valve in the general population (52%) than on the mitral valve (14%). The posteroinferior part of the valve and the intervalvular fibrous body are most commonly affected.

The number of patients on chronic haemodialysis due to end-stage renal failure is significantly increasing every year. They have up to 17 times higher incidence of infective endocarditis than the general population. Possible causes are higher incidence of degenerative heart disease, accelerated development of valvular calcifications due to calcium metabolism dysfunctions, more frequent episodes of bacteraemia and disorders of the immunological system. The mitral valve is most commonly affected (up to 50%), usually with Staphylococcus aureus (up to 80%). In our case, Enterobacter spp. was isolated from operative specimens. Enterobacter spp. belongs to the group of Gramm negative bacteria that cause 10% of cases of IE in this group of patients.

There are several difficulties in diagnosing IE in chronically haemodialysed patients: limited acceptability of DUKE criteria (the vascular access as a potential source of bacteraemia; less common fever due to impaired immune system). TEE should be performed in every HD patient suspected of IE, in order to diagnose the disease in a timely manner and to prevent the development of possible complications. TEE demonstrates poorer efficacy in diagnosing small abscesses, especially when annular calcifications are coexistent, which is more often the case in HD patients. Because of high propensity for tissue calcium deposition, in group of HD patients, in differential diagnosis of mitral paravalvular abscesses mitral annulus calcification (MAC) must be considered, or its rare variant caseous calcification of mitral annulus (CCMA). The incidence of CCMA is about 0.63% of all MAC cases. CCMA is usually located on the posterior mitral leaflet and carries a benign prognosis. However, it can be a predisposing factor for infective endocardits, therefore, patients with this diagnosis require careful follow-up.

The presence of paravalvular abscess as a complication of IE significantly increases the complexity of surgical treatment and leads to increased mortality. The basic principle of surgical treatment of mitral valve paravalvular abscess is aggressive debridement and resection of the infected tissue. Annular defect after debridement can be reconstructed by a pericardial patch. A fresh autologous pericardium is better for annular reconstruction that is subtended by the cardiac muscle. Glutaraldehyde fixed pericardium or Dacron fabric are better for intervalvular fibrous body reconstruction. The use of biological glue can lead to improved outcomes of reconstructive procedures. The tissue of the left atrial appendage can also be used in the reconstruction of the mitral annulus. In our case, debridement of the abscess cavity was performed, and the defect did not require pericardial or other reconstruction. After debridement, the mitral valve was replaced by a biological mitral valve prosthesis.

The choice of replacement valve in HD patients depends on the life expectancy and on concomitant diseases. In younger, healthier HD patients, mechanical valves should be used. In senior HD patients with lower life expectancy, biological valves should be used. The need for anticoagulation therapy and the increased risk of hemorrhage render mechanical valves less desirable in this group of patients.

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EXCESSIVE BREAST SKIN NECROSIS AFTER SINGLE INTERNAL MAMMARY ARTERY HARVESTING

Running head: Breast Skin Necrosis After IMA Harvesting

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Abstract

There are still a lot of contradictory reports about single or bilateral, pedicled or skeletonized internal mammary artery (IMA) harvesting and its implication on sternal microcirculation and wound complications even in diabetic patients. We present the case of excessive breast skin necrosis after single IMA harvesting in a diabetic patient with necrosis progression far from the acute phase that finally has demanded for breast amputation.

Keywords

mediastinal infection, sternum, wound dehiscence, CABG, arterial grafts

Case report

We would like to present the case of a 48-year-old woman, M.B., admitted at the Department of Cardiac Surgery of our hospital on August 2nd 2006 after coronarography, which indicated myocardial revascularization (EF of the left ventricle was 40%, NYHA status III: EuroSCORE: 4). She suffered from insulin dependent diabetes for 15 years with polyneuropathy, polyangiopathy and nephropathy. From the beginning of 2005 she had symptoms of stable angina pectoris and in September 2005 she was hospitalized in another hospital for treatment of acute inferoposterior myocardial infarction. Revascularization was done in our hospital on August 4th 2006 using a single, pedicled left IMA for the left anterior descending artery (LAD) and a saphenous vein graft (SVG) for the posterior descending coronary artery (PD), in general anesthesia, hypothermia and assistance of extracorporeal circulation. On the first day after the procedure she became febrile with a following development of septic shock with renal failure and acute respiratory distress syndrome (ARDS). Hemoculture isolated Enterococci. During her stay in the Intensive Care Unit hemodynamic stabilization, targeted antibiotic treatment, tracheotomies (November 11th 2006), mechanical ventilation and hemodialysis because of renal insufficiency (19 procedures) have been done. On the 10th postoperative day the inotropic support was revoked and pleural and mediastinal drains were removed. On the 14th day she was disconnected from the mechanical ventilation

with spontaneous breathing. Wound culture isolated Staphylococcus Aureus and Pseudomonas Aeruginosa, in urinoculture Excherichia Coli and in bronchoaspirated material Acinetobacter Baumannii and Candida Albicans. The antibiotic treatment was corrected and the patient transferred to the Department of Cardiac Surgery on the 27th postoperative day. The cannula was removed on September 13th 2006.

A plastic surgeon was consulted on the 6th day after surgery, during her stay in the Intensive Care Unit, because of a small area of livid skin below areola of the left breast (2 x 3 cm), which was treated locally (Silver Sulfadiazine). We did not notice any other discoloration or contusion marks on the anterior thoracic wall skin. Because of the general condition and presumed acute phase of relative anterior hemithoracic ischemia after single IMA harvesting, the lividity was accepted as a transitory condition. A few days later, the local status was without noticeable progression and the treatment was the same. The next week visit discovered necrosis of the previously described area with small marginal progression, which was treated conservatively (Purilon gel and Biatain-Ag, Coloplast Ltd). Following consultations noticed further necrosis progression encompassing half of the total breast skin with extension to the sternal area (Figure 1a), which was treated with necrectomy and Biatain-Ag dressing (Figure 1b). Upon achieving a better local condition, on November 13th 2006, we covered the defect with split-thickness mesh skin graft (1:1,5) (Figure 1c) that resulted in total lysis of the graft and further progression of necrosis. With compensated general condition, she was transferred to the Department of Plastic Surgery on October 26th 2006. We decided, a few days later, to do radical debridement which resulted in partial skin sparing mastectomy of the left breast and a direct closure of the defect. On the next visit we noticed the wound dehiscence of the sternal region with further progression of the necrosis to the right inframammary fold (Figure 1d). We did the necrectomy again and applied the Negative Pressure Wound Therapy (V.A.C.® KCl) to the defect for one week to achieve clean granulation (2 days of continual and 5 days of intermittent suction, -125 mmHg) (Figure 2a). It was followed by split-thickness mesh skin graft (1:1,5) (Figure 2b) with V.A.C. fixation of the graft for three days (continual suction, -75 mmHg) that resulted in partial epithelization (more than two-thirds) (Figure 2c). We continued with regular dressing on the ambulatory basis (Comfeel Plus Transparent, Coloplast Ltd) until total reepithelization was completed, which was noticed on January 30th 2007, 6 months after the initial procedure (Figure 2d).

Comment

According to some reports, even bilateral internal mammary artery usage has not been found as an independent risk factor for wound complication [1] and diabetes was not a cause of sternal ischaemia after IMA harvesting [2].

Earlier experimental animal studies of the sternal blood flow have reported significant devascularization of each hemi-sternum according to the corresponding IMA usage (more than 90% of its blood supply) [3].

More recent studies have made a distinction between pedicled and skeletonized IMA harvesting so the sternal microcirculation after pedicled harvesting has shown significant decrease of microcirculatory blood flow and retrosternal tissue oxygen saturation [4]. However, the parameters of microcirculation in the presternal area remained unchanged compared to the baseline values. Other studies have also shown acute postoperative sternal ischaemia for a pedicled IMA graft, but this does not occur when the IMA was skeletonized [5].

The metaanalysis of 106 papers has concluded that skeletonisation should be the technique of choice for diabetics in whom bilateral IMA harvest is desired, but no convincing outcome benefits have been shown for single IMA harvest [6]. Nevertheless, our case, although with a single IMA harvest, resulted in a dreadful necrosis progression.

The correlation of sternal ischaemia and IMA usage is more significant in the acute phase, within two weeks, because it resolves with time, presumably due to opening of collateral vessels [7]. In our case, the progression of necrosis has continued with time far from the acute phase.

We would like to emphasize this case of excessive breast skin necrosis with sternal extension not because of the mentioned treatment modalities, which could be of different preferences, but to stress the importance of meticulous "cost-benefit" estimation of even single IMA usage or preservation in patients with diabetes.

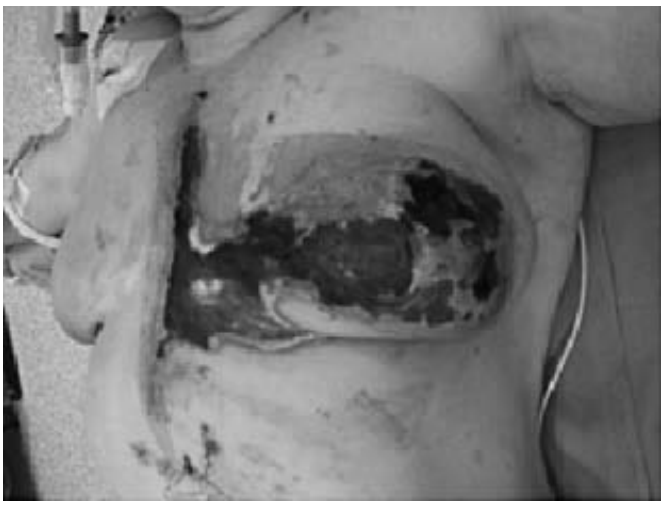

Figure legends

Figure 1a. Necrosis of half of the total breast skin with extension to the sternal area

Figure 1b. Status after necrectomy

Figure 1c. Defect covered with split-thickness mesh skin graft (1:1,5)

Figure 1d. Condition after partial skin sparing mastectomy of the left breast and direct closure of the defect - further progression of the necrosis to the right inframammary fold

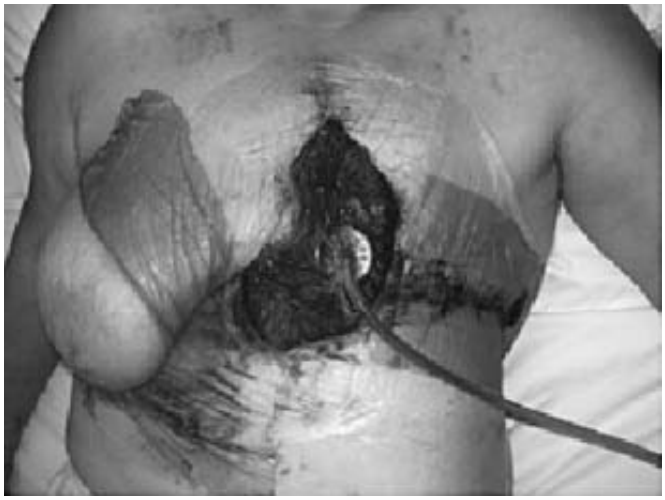

Figure 2a. Status after repeated necrectomy and application of the Negative Pressure Wound Therapy (V.A.C.® KCI)

Figure 2b. Split-thickness mesh skin graft (1:1,5) (Figure 2b) with V.A.C. fixation of the graft for three days (continual suction, -75 mmHg)

Figure 2c. Partial epithelization (more than two-thirds)

Figure 2d. Total reepithelization 6 months after the initial procedure

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TREATMENT OF WAR INJURIES OF THE UPPER EXTREMITY DURING WAR IN SOUTH-WESTERN CROATIA

Running head: War Injuries of the Upper Extremity

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Abstract

Objectives

The aim of this study was to analyze the epidemiology, treatment and incidence of complications among the patients with upper extremity war injury.

Methods

In retrospective study, 123 patients with war injuries of the upper extremity have been analyzed. The results of treatment were assessed according to the rate of: complications, amputations, fracture healing and mortality.

Results

Complications appeared in 17.9% of cases. Traumatic amputations were present in 19.4% of cases and in 2.4% of cases amputation was performed due to III C open fracture. Satisfactory bone healing was achieved in 49 of 55 patients available to follow up. Mortality rate was 2.4%.

Conclusion

Self-inflicted injuries resulted in 41.6% amputation rate. High-energy war injuries of the upper extremity could be treated between 6 and 12 hours after injury without an increase in complication rate, compared to treatment up to 6 hours from injury. In selected cases primary reconstruction of war injury could be performed.

Keywords

Croatia, treatment outcome, upper extremity, war injuries, war surgery, wound healing

Liječenje ratnih ozljeda gornjih ekstremiteta tijekom rata u jugozapadnoj Hrvatskoj

Sažetak

Podloga

Cilj ove studije bio je analizirati epidemiologiju, liječenja i učestalost komplikacija kod bolesnika s ratnim ozljedama gornjih ekstremiteta.

Metode

U retrospektivnoj studiji analizirana su 123 bolesnika s ratnim ozljedama gornjih ekstremiteta. Rezultati liječenja procijenjeni su na temelju učestalosti komplikacija i amputacija, sanacije prijeloma i mortaliteta.

Rezultati

Komplikacije tijekom liječenja pojavile su se u 17,9% bolesnika. Traumatske amputacije nastale su kod 19,4% ozljeđenika, a kod 2,4% ranjenika amputacija je učinjena zbog otvorenog prijeloma III C stupnja. Zadovoljavajuće cijeljenje prijeloma postignuto je kod 49 bolesnika, od 55 koji su bili kontrolirani do završetka liječenja. Mortalitet je u ovoj skupini ranjenika iznosio 2,4%.

Zaključak

Samoozljede su rezultirale s učestalošću amputacija od 41,6%. Ratne ozljede nastale prijenosom velike količine energije mogu se liječiti u razdoblju između 6 i 12 sati nakon ozljede, bez porasta komplikacija u odnosu na ranjenike liječene unutar 6 sati od ozljede. U posebno indiciranim slučajevima može se učiniti i primarna rekonstrukcija ratnih ozljeda gornjeg ekstremiteta.

Ključne riječi

Hrvatska, ishod liječenja, gornji ekstremitet, ratne ozljede, ratna kirurgija, cijeljenje rane

Introduction

The incidence of the upper extremity injuries in the Second World War was 26% [1]. In modern wars the incidence of extremity injuries was over 75% with more than ⅓ associated with bone fractures [2]. The number of injured during combat usually exceeds the capability of medical service and these patients require proper triage and treatment. During war history, the treatment of upper extremity war injuries was changing from amputation as a life-saving procedure, to salvage and reconstructive procedures with aggressive rehabilitation to regain hand function [3]. Despite the progress in the treatment and development of surgical reconstructive techniques in the Vietnam and Korean War, there has been an increase in amputation rate of extremity with a decrease in the mortality rate of the wounded in comparison to the Second World War [4]. The nature of combat injuries is also changing because of the development of different weapons and changing of fighting tactics [5].

The aim of this study was to analyze the outcome and incidence of complications in the treatment of the wounded with upper extremity injury during the war in Croatia.

Materials and Methods

This research was carried out as a retrospective study. We analyzed 123 consecutive patients with upper extremity injuries caused by gunshot or explosive weapons, 103 out of whom were followed up to the end of the treatment. All the patients were treated at our Division of Traumatology from August 1991 until December 1995. This group of injured represents 18.7% of 658 wounded persons treated in our University Hospital (UH) during the same period.

The wounded were treated on the principles of war surgery [1]. Most of the wounded were treated in War Hospitals (WH) by mobile surgical teams [6]. After surgery, the wounded were transported to UH. Some of the wounded were transported directly to UH because of the short distance from the battlefield.

During the initial treatment, each wounded had received tetanus prophylaxis (tetanus toxoid and tetanus immune globulin 250–500 I.U.) and combined antibiotic therapy (penicillin G, gentamycin, metronidazole). After diagnostic procedures, the wounded were treated in the operating room. In the aseptic environment all foreign bodies, necrotic and devitalized tissue were removed [7]. Wounds were copiously irrigated with saline solution. During the debridement pneumatic tourniquet was used, but it was inflated only in case of massive bleeding [7]. The fasciotomy and epimysiotomy were performed in cases of massive tissue destruction

or vessel injuries [2, 8]. The wounds were mainly left open, drained and covered with chlorhexidine solution dressing. Wounds with massive tissue destruction were explored after 24 to 48 hours [2]. Isolated, low-energy soft tissue injuries were covered with sterile dressing without debridement being performed. The control of the local and general signs of infection was performed daily [2, 9, 10].

In selected cases, the primary wound closure with flaps was a method of choice to preserve hand function [8, 11, 12]. The indications for primary wound closure were: debridement performed within 12 hours from the injury, successful debridement without questionable areas left, tissue defect with exposure of the bone, tendons, vessels or nerves, isolated injury of upper extremity, no signs of shock or chronic diseases, and an available experienced surgical team.

Blood vessels were repaired with end-to-end anastomosis or autologous vein graft. The synthetic graft was not used [13].

Open fractures of upper extremity were classified according to Gustilo [14]. Fractures were primarily treated with external fixation. The CMC (Croatian Medical Corps, Instrumentaria, Zagreb, Croatia) and Zagreb I and II (Hospitalia, Zagreb, Croatia) used external fixators [15, 16]. Intraarticular fractures were managed with additional Kirschner wires or lag screws to restore the articular surface. When small external fixators for hand were not available, the stabilization of the fracture was achieved with Kirschner wires [8, 11, 17] and with plaster-of-Paris splints [8, 12].

Nerves were explored only in cases when they were in the zone of debridement. In case of nerve lesion away from the zone of tissue necrosis, the treatment was conservative until the wound healed. When nerve function did not recover, the exploration was done after 3 to 4 months [18]. Tendon injuries frequently resulted with a defect that required surgical reconstruction (two-stage tendoplasty) after the wound healed.

The amputation of upper extremity was indicated in case of extensive injuries with obvious non-viable or necrotic tissue and incurable life-threatening infection [1].

The patients were classified according to: age, gender, mechanism (explosive or gunshot projectile) and severity of injury, anatomic region of injury, type of injured tissue, time having passed from injury to primary surgical treatment, range of surgical treatment, duration of hospitalization and duration of treatment.

The results of treatment were assessed as follows:

1. Mortality rate
2. Complications
   As a complication we consider every condition or illness that was likely to jeopardize the process of treatment and recovery.
3. Amputation
   Amputation was determined as the loss of a part of the extremity including more than one phalanx of the finger.
4. Fracture healing

Malposition, non-union or chronic posttraumatic osteomyelitis (OM) was considered a poor result. The judgment was made according to clinical findings and X-ray.

Statistical analysis

All values were presented as the mean value ± standard deviation. Statistical analysis was done with software Statistica 4.3 (StatSoft. inc.), using Mann-Whitney U test and Wilcoxon match pairs test.

Results

The average age of the wounded was 32.6 (±14.2) years, ranging from 7 to 89 years. There were 115 (93.5%) males and 8 (6.5%) females. Most of the wounded were soldiers 83 (67.5%) and 40 (32.5%) were civilians including 8 (6.5%) children under 18 years of age. The relation between explosive and gunshot injuries was 76 (61.8%) : 47 (38.2%). High-energy injury was present in 104 (84.6%), and low-energy injury in 19 (15.4%) patients. Accidental self-inflicted injuries were present in 36 cases (29.3%), among children in 7 of 8 cases (87.5 %). The localization of injuries is shown in Figure 1 and the type of injury in Figure 2. Concomitant injuries of other body regions were present in 61 (49.6%) of the wounded. Urgent surgery was performed in 23 wounded (18.7%) because of the life-threatening injuries of other body regions. All the wounded treated in WH (83 or 67.5%) survived the transport to UH. In general 122 (99.2%) wounded were managed within 12 hours from injury, among whom 98 (79.7%) within the first 6

hours. Primary therapeutic and surgical procedures during admission are shown in Table 1.

The reconstruction of the arteries was performed in 6 (4.9%) patients: 5 (4.1%) with autologous vein graft, and in one with end-to-end anastomosis. Arterial bleeding and distal ischemia were obvious in all 6 patients and arteriography was not indicated. A temporary shunt was used in 1 (0.9%) patient.

Out of 69 patients with 3rd degree open fractures, 55 were followed till the end of bone healing. Satisfactory healing was achieved in 49. At the end of the treatment an unacceptable position of the bone was present in 6 wounded.

External fixation was used for fracture stabilization in all 35 patients who sustained long bone fractures. A correction of external fixation was necessary in 5 cases due to unsatisfactory reduction. The delayed union and non-union were an indication for additional surgery in 9 patients (bone grafting and plate fixation in 4 cases, bone grafting and external fixation in 2 cases, plate fixation in 2 cases, circular Ilizarov external fixation in 1 case). The fracture healed in all of the 28 followed patients.

Reconstruction of soft tissue defects was performed in 26 (21.1%) wounded with extensive injuries. In 13 cases it was performed immediately after the debridement and in another 13 patients soft tissue reconstruction was performed later, in the phase of secondary healing (Figures 3-5). The applied reconstructive surgical procedures are shown in Table 2. Hand injuries were the most common location of primary reconstruction, i.e. in 9 cases (7.3%). Thirteen (10.6%) wounded with primary closure of the wound did not have higher incidence of complications in comparison to the wounded where reconstruction was performed during the phase of secondary healing.

Postoperative complications appeared in 22 (17.9%) wounded (Table 3). The analysis of incidence of the complications brought forth the following conclusions:

There was no correlation between incidences of complications in relation to the type of the upper extremity injury.

The higher incidence of complications, in 18 (14.6%) cases, was found in the group of wounded with concomitant injuries in relation to the group of the wounded with isolated upper extremity injury, i.e. 4 (3.3%) of them ($p<0.05$).

There was no difference in the incidence of complications between the group of the wounded treated during the first 6 hours after injury and the group of the injured treated within the 6 to 12 hours period after injury. These two groups were statistically different regarding the type of injury, but there was no difference in the distribution of high-energy and low-energy injuries.

There was no difference in the incidence of complications between the group of patients with primary soft tissue reconstruction and the group of the wounded where the soft tissue reconstruction was done in the phase of secondary healing.

Amputation was the result of injury in 20 (19.4%) out of 103 (100%) followed patients. Reamputation was performed in 16 (13%) cases because of traumatic amputation of fingers, in 3 (2.4%) cases due to traumatic amputation of the forearm and in 1 (0.8%) case due to traumatic amputation of the upper arm. The III C open fracture was an indication for the forearm amputation in 1 (0.8%) and for the finger amputation in 2 (1.6%) cases. Self-inflicted injuries resulted with 41.6% rate of traumatic amputation ($p<0.001$) in comparison with injuries sustained from another person.

The average duration of the first hospitalization was 20 (±19) days, ranging from 1 to 112 days. The mortality rate was 2.4%; 2 wounded died from severe thoracoabdominal injuries and one died after traumatic amputation of both lower extremities complicated with sepsis and multi-organ failure. In the 103 (83.7%) followed patients the average follow up was 14.6 months (ranging from 3 to 31) after the first discharge from UH. The average time of healing was 11.6 months, ranging from 1 to 52 months.

Discussion

The main goal of the treatment of extremity war injuries is to preserve the limb viability and to prevent the appearance of an infection. Early treatment of the wounded close to battlefield has created good preconditions for the treatment in UH. In this series of injuries we found no statistical significance in the incidence of complications between the injured treated during the first 6 hours and patients treated within the 6 to 12 hours period after the injury. The triage of mobile patients with the upper limb injuries to rear hospitals can relieve the surgical team. This should

be different from the treatment of the lower limb war injuries where the poor soft tissue coverage of the lower leg and weaker circulation probably cannot tolerate such a delay.

The debridement is the most important part of early treatment in extensive high-energy war injuries, and its role in prevention of wound infection has been proved [3, 4, 7, 14, 19-22]. One study pointed out that this procedure is frequently performed inadequately [23]. It is also known that the low energy war injuries of soft tissues could be treated conservatively, without debridement, if indications are strictly respected [2, 7, 9, 10]. It should be pointed out that history data about the weapon and mechanism of injury are mainly unknown and rarely accurate, therefore the decision for the management of the wound depends mostly on wound aspect and fracture pattern, with recommendation that the most experienced surgeon must be consulted.

It is generally accepted that primary closure of war injuries increases the likelihood of infection [7, 24], but on the other hand it is very important to perform an early reconstruction of hand injuries to preserve the viability of exposed tissue, reduce the edema and fibrosis, and prevent stiffness [8, 12, 25]. Primary reconstruction of war injuries, after initial aggressive and complete debridement, was performed in 13 patients without the appearance of local infection or other complications. Skin defects on the hand (6 cases) were covered with a groin flap. This flap is easy to use; it can be well adapted to the hand, has good vascularization and substitutes the missing skin and subcutaneous tissue (Figures 3-5). We respect strict indications for primary closure of war wounds with soft tissue defect: debridement done within 12 hours from injury, successful debridement without questionable areas left, isolated injury of upper extremity, no signs of shock or chronic diseases, and an available experienced surgical team.

The external fixation in long bone war fractures could be considered successful because bone healing was achieved in all wounded. The problems and difficulties after external fixation that included malreduction and axis deviation (13.9%) often resulted from unavailability of the image intensifier under war conditions. Good fracture healing was achieved with initial external fixation in 67.9% of the wounded in comparison with 57.1% of the wounded with successful initial external fixation published by Croatian authors in similar conditions [26]. In this series of wounded, there were no pin tract infections that would demand surgery, although the incidence of pin tract infection in literature ranges from negligible to 78.7% [2, 15, 21, 22]. In all cases local treatment and antibiotic therapy were sufficient to eradicate the local secretion. It is known that instability of construction and positioning of the pin too close to fracture are the main causes of pin tract infection [21]. Therefore, a wide range of incidence from literature is probably the consequence of imprecise definition and different assessment of pin tract infections.

We did not reveal any case of chronic posttraumatic osteomyelitis (OM) what is in contradiction with other Croatian authors who have analyzed the treatment of war extremity injuries. They published the incidence rates of OM 7.6% [26] and 7.75% [15]. These results are not comparable because they did not distinguish the incidence of OM in upper or lower extremities. Better anatomical conditions, good vascularization and bulky soft tissue coverage are surely the important factors in decrease of OM incidence in the upper extremities. Complete eradication of infection was reported in cases of war injuries of the shoulder [27] and elbow war injuries [28]. Furthermore, it has been confirmed that delayed treatment, fracture instability and insufficient debridement of the war wound are agents of wound infections and OM [21, 22]. Our observation is that we could provide a radical debridement and surgical treatment by qualified surgeons within 12 hours from injury, despite the disastrous war conditions.

Low rate of amputation (2.4%) after open grade III fracture suggests that with appropriate surgery and good timing we were able to save the viable limb in most of the patients, although there is a recent report with 9.3% of upper extremity amputation because of vascular injury during Iraqi Freedom Operation [29].

It is important to notice a high percentage of self-inflicted injuries (29.3%), especially in children (87.5%). These injuries resulted in high percentage of amputations (41.6%) and unfavorable results. Out of 17 patients who sustained a traumatic amputation, 15 cases were caused by a self-inflicted injury. Undertrained unprofessional

soldiers handling different arms and availability of explosive weapons to children in war conditions were the main reasons for these preventable accidents.

The limitations of our study include retrospective analysis and wide variety of injuries in different regions of upper extremity that made this group of patients inhomogeneous according to the type of injury.

Conclusions

Preventable self-inflicted injuries were present in 36 (29.3%) cases. These injuries resulted with high traumatic amputation rate of 41.6%.

There is no difference in the incidence of complications between the injured treated during the first 6 hours and the group of patients treated within 6 to 12 hours period after injury. Our study suggests that we can tolerate the delay in treatment of the isolated upper limb war injury (excluding vascular injury and traumatic amputation) up to 12 hours after injury without higher incidence of complications on the upper extremity. This is an important message in combat situations when mobile surgical teams and war hospitals can be overcrowded with patients.

In selected cases the primary reconstruction of extensive war injuries of the upper extremity could be done. The primary reconstruction could not be the rule due to triage and logistic problems in the reality of war. It should be done only in specialized centres by experienced surgeons.

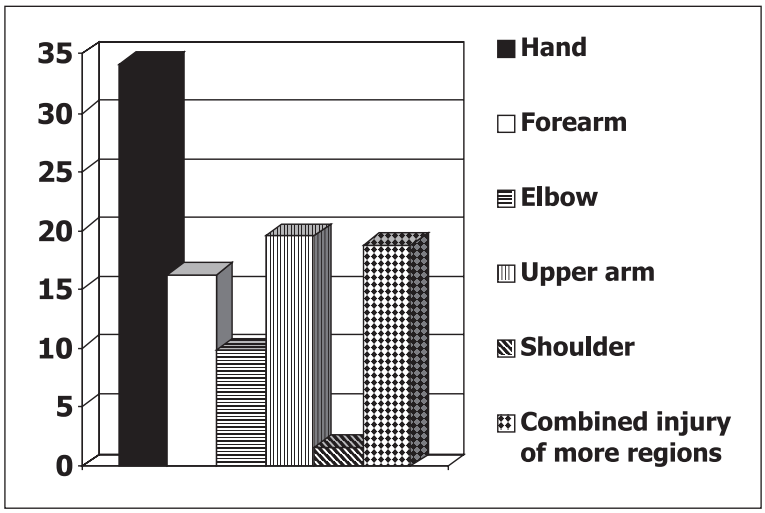

Figure 1.

Distribution of injuries

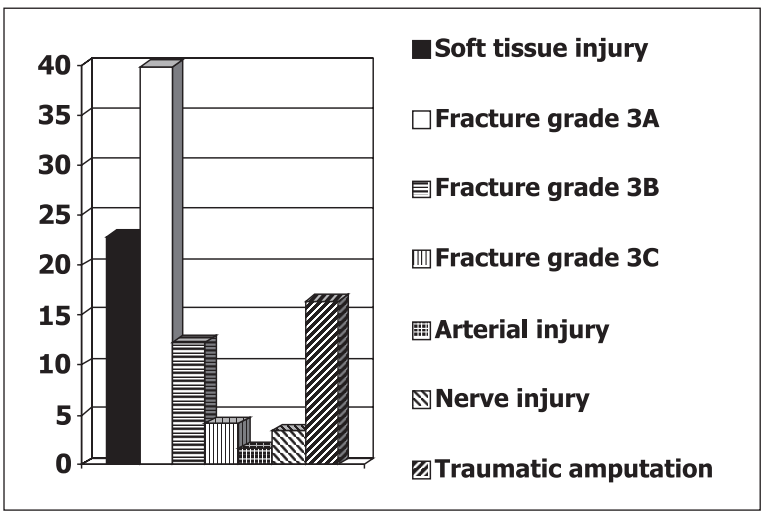

Figure 2.

Type of injury

Figure 3. Soft tissue defect after explosive injury of the elbow and lower arm in the phase of secondary healing

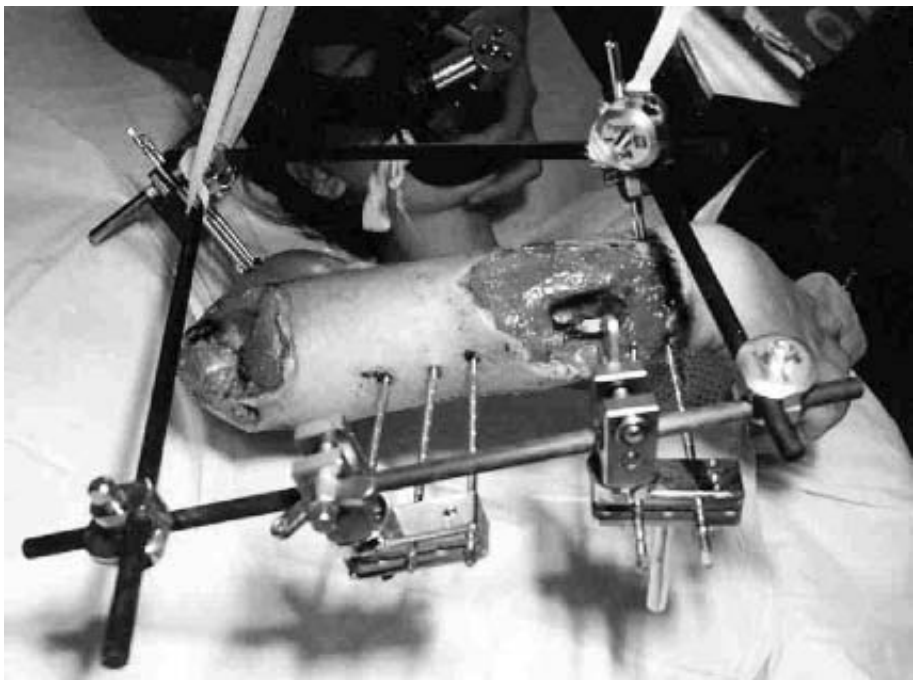

Figure 4. Groin flap used for soft tissue reconstruction of lower arm

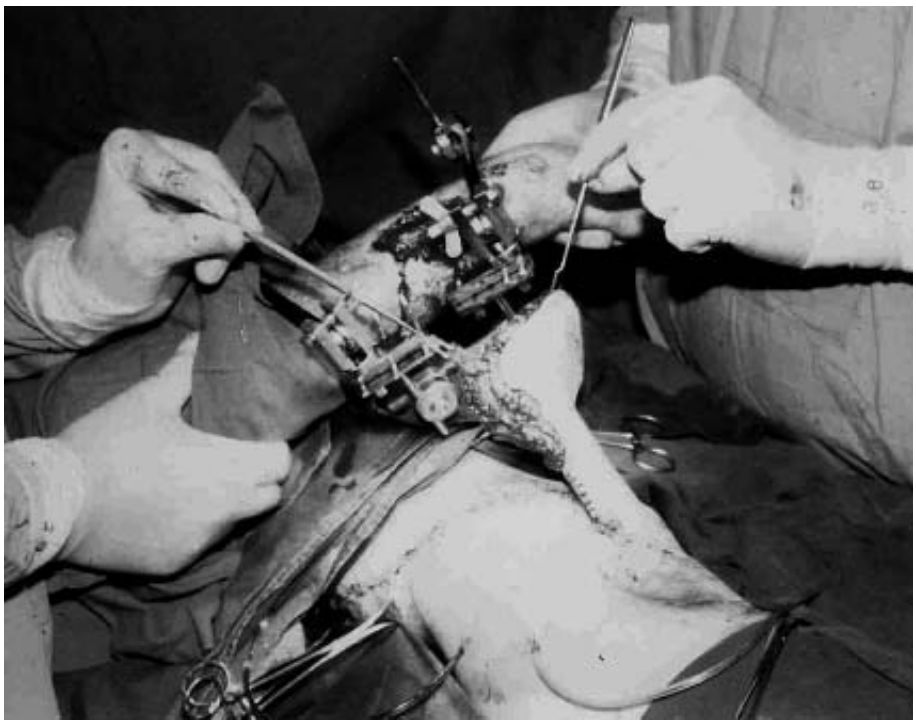

Figure 5. TResult after soft tissue reconstruction, elbow arthrodesis and healing of radial fracture (distal part of the ulna is missing, ulnar nerve palsy remains) – the pinch grip

Table 1. Primary therapeutic and surgical procedures in War Hospitals (WH) and University Hospital (UH)

WH	UH	
	No patients (%)	No patients (%)
Urgent surgery due to life-threatening injury	12 (14.5%)	9 (22.5%)
Amputation	0	3 (7.5%)
Reamputation	4 (4.8%)	14 (35%)
Vascular repair	4 (4.8%)	2 (5%)
Débridement	62 (74.7%)	34 (85%)
Plaster immobilization	58 (69.9%)	12 (30%)
External fixation	16 (19.3%)	19 (47.5%)
Osteosynthesis with K wires	0	9 (22.5%)
Plate osteosynthesis	0	1 (2.5%)
Tetanus prophylaxis	83 (100%)	40 (100%)
Antibiotic therapy	83 (100%)	40 (100%)
Soft tissue reconstruction	0	13 (32.5%)
Total	83 (100%)	40 (100%)

Table 2. Surgical procedures used for soft tissue reconstruction

Wound closure	Primary	Secondary
Split thickness graft (STG)	7	4
Groin flap	5	4
		1+TF
		1+STG
Transposition flap (TF)	1	1
Island flap (Lateral arm)	0	1
Island flap (M. latissimus dorsi)	0	1
Total: 26	13	13

Table 3. Postoperative complications

	Patients	
Type of complication	No	(%)
Wound infection (WI)	7	5.7%
Urinary tract infection (UI)	4	3.3%
Respiratory infection (RI)	1	0.8%
Respiratory failure	2	1.6%
Cardiac arrest	1	0.8%
WI + RI + UI	2	1.6%
WI + RI + Acute renal failure	1	0.8%
UI + Sepsis	1	0.8%
WI + Sepsis	1	0.8%
Postoperative bleeding + RI	1	0.8%
Total	22	17.9%

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OSVRT NA STRUČNI SKUP U GOSPIĆU

Kulturno informativni centar Gospić, 7. svibnja 2011.

U organizaciji Hrvatskoga kirurškog društva i Odjela za kirurgiju Opće bolnice Gospić 7. svibnja 2011. u prostorima Kulturno informativnog centra u Gospiću održan je redoviti stručni skup namijenjen prvenstveno specijalistima i specijalizantima kirurgije koji članovi Društva održavaju dva puta godišnje diljem Hrvatske. Okupilo se preko stotinu priznatih stručnjaka s raznih područja kirurgije koji su slušali ili držali predavanja te aktivno sudjelovali u raspravama o aktualnim temama. Skup je otvoren uvodnim riječima predsjednika Društva prof. dr. sc. Mate Majerovića, zatim potpredsjednika Vlade i ministra zdravstva i socijalne skrbi mr. sc. Darka Milinovića, gradonačelnika Gospića Milana Kolića, župana Ličko-senjske županije Milana Jurkovića i ravnateljice Opće bolnice Gospić Marije Vrkljan Ilijevski, dr. med., koji su okupljenima zahvalili na dolasku, istaknuli važnost održavanja ovakvih stručnih skupova te podsjetili na uspješan zajednički rad gospićkih kirurga i kirurga ostalih hrvatskih bolnica tijekom Domovinskog rata. Prije početka predavanja nastupili su članovi Hrvatskoga kulturno umjetničkog društva Perušić i na taj način još jednom velikodušno gostima zaželjeli dobrodošlicu.

Predavanja su bila zamišljena kao raznoliki spektar tema koji će svim sudionicima pružiti mogućnost da se upoznaju s novim tehnikama i pristupima kirurgiji, kao i načinima rješavanja problema s kojima se u svom poslu svakodnevno susreću. Prisutni su mogli postavljati pitanja i na njih dobiti odgovore te s kolegama porazgovarati o vlastitim iskustvima.

Prvo predavanje održao je Čedomil Vukelić, dr. med., i kao jedan od domaćina predstavio pregled razvoja kirurgije u Općoj bolnici Gospić i tijek

kojim se ona razvijala na tom području, od samog početka do danas. Posebna pozornost posvećena je ratnom periodu, u kojem su kirurzi drugih hrvatskih bolnica dolazili na ispomoć u Opću bolnicu Gospić koja je tih godina bila od posebne važnosti i kojoj je ta pomoć bila od velikog značenja.

Nakon uvodnog predavanja slijedila su stručna izlaganja Alena Čargonje, dr. med., i doc. dr. sc. Anka Antabaka. Alen Čargonja, dr. med., održao je predavanje „Minimalna laparotomija i gastroskopija u liječenju perforiranog vrijeda želuca" o minimalno invazivnim tehnikama korištenim u navedenoj operaciji. Radi se o danas aktualnoj temi sve učestalijeg korištenja modernih tehnologija u operacijskim salama, što, uz ostale prednosti, svakako pridonosi bržem oporavku pacijenata i kraćoj hospitalizaciji. Doc. dr. sc. Anko Antabak u svom predavanju „Jednodnevna kirurgija u KBC-u Zagreb" izložio je način funkcioniranja Jednodnevne kirurgije, nove organizacijske jedinice KBC-a Zagreb. Jedinica funkcionira tako da pacijenti u bolnicu dolaze ujutro, do podneva su operirani, a poslijepodne odlaze kući. Postupno je povećan i broj i opseg operacijskih zahvata, kao i dobni raspon bolesnika (Jednodnevna dječja kirurgija). Kirurzi KBC-a Zagreb tijekom posljednje dvije godine uspješno provode ovakav tip liječenja - povećavaju protočnost odjela, smanjuju liste čekanja i podižu kvalitetu medicinskih usluga. Pacijenti su zadovoljni, a budući da je i spomenutoj zdravstvenoj ustanovi Jednodnevna kirurgija ekonomski prihvatljiva, uspješno se zatvorio krug korisnosti i isplativosti. U raspravi nakon predavanja doc. dr. sc. Anka Antabaka bilo je mnogo pitanja o načinu organizacije ovakvih odjela i u drugim hrvatskim bolnicama, što pokazuje da postoji velik interes za osnivanjem sličnih jedinica u bolnicama koje ih još nemaju.

Završno predavanje održao je Ivica Crnić, dipl. iur., s temom „Greške i komplikacije u kirurgiji". Tema je bila vrlo zanimljiva i izazvala je burnu raspravu, s velikim brojem pitanja. Nakon polusatne rasprave, bilo je jasno da nema jedinstvenog mišljenja o modelu naknade štete bolesnicima, koji nakon

operativnih zahvata imaju neželjene trajne posljedice. Završno mišljenje na ovu temu dao je Ante Zvonimir Golem, dr. med., državni tajnik Ministarstva zdravstva i socijalne skrbi, koji promovira model osnivanja posebnog fonda iz kojeg bi se isplaćivala novčana naknada, tj. obeštećenje bolesnicima, i to bez sudskih procesa dokazivanja liječničke greške. Detaljno je predstavio načine punjenja ovog fonda i iznio iskustva zemalja koje već imaju takav model.

Nakon stručnih predavanja održan je i sastanak Upravnog odbora Hrvatskoga kirurškog društva, dok su se ostali sudionici uputili prema restoranu na društveni dio programa.

Nakon stručnog dijela, svi okupljeni opustili su se u ugodnom društvu kolegica i kolega, gostoprimstvu domaćina i zakusci koja je pripremljena u restoranu Prašina u Podoštri. Uslijedio je posjet Memorijalnom centru „Nikola Tesla" u Smiljanu gdje su sudionici uz pratnju stručnog vodiča mogli saznati i manje poznate činjenice o našem velikom znanstveniku i izumitelju te vidjeti neke od njegovih inovacija. Druženje je privedeno kraju zanimljivim i poučnim obilaskom rodne kuće Ante Starčevića, Oca domovine, u Velikom Žitniku.

Bilješke / *Notes*