Hepatic cirrhosis and groin hernia: binomial or dichotomy?

Our experience with a safe surgical treatment protocol

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Hepatic cirrhosis and groin hernia:binomial or dichotomy? Our experience with a safe surgicall treatment protocol

Hepatitis B and C are endemic in the Campania region of Italy, and as a result there are many patients with hepatitis-related cirrhosis. The medical community is therefore faced with a series of issues which must be dealt with and which are especially relevant to various areas of surgery. Abdominal wall hernias occur very frequently in cirrhotic patients, and hepatic cirrhosis has always been the harbinger of a negative outcome in patients undergoing inguinal hernia repair. The aim of this study, conducted on 52 cirrhotic patients who underwent inguinal hernioplasty, was to evaluate the effectiveness and safety of surgical treatment when certain parasurgical measures are used. These measures and the notes we inserted in our surgical protocol include the following: short-term antibiotic prophylaxis, perioperative infusion of concentrated platelets, not opening the hernia sac, application of human fibrin glue, elastic compression. All patients were treated according to the same protocol and the data was analysed using the statistics software EPI INFO 3.5.

KEY WORDS: Cirrhosis, Complications, Inguinal hernia repair, Parasurgical measures.

Introduction

Hepatitis B(HBV) and hepatitis C(HCV) are endemic in the Campania region of Italy, and as a result there are many patients with hepatitis-related cirrhosis. Numerous studies confirm that hepatitis viruses are present all over the world, and the annual incidence of hepatitis infection in Italy is around 4% [1].
Epidemiological studies in Italy have found that in individuals born before the 1950s the prevalence of HBV & HCV is > 3%, and highest in the southern regions. The prevalence is even higher in individuals > 60 years old, because in the past sharp instruments pontentially contaminated with HBV/HCV, such as razors, glass syringes or even disposable ones, surgical and dental instruments, were used/reused without being properly sterilized. The graphs of the standardized mortality rates for HBV/HCV-related cirrhosis in Naples, the Campania region, and Italy as a whole, show how in Campania and its capital city, Naples, the levels of HBV and HCV infection have been relatively stable recent years (data from the epidemiology and prevention service (S.E.P)- community health center - Asl 1 - Naples) [2] (Table I, II).
In particular, between 2002 and 2005, 101 women and 100 men in 35 towns in the area served by the community health center 4 in Naples (S.E.P.data from Asl 4, Naples) died of HBV/HCV-related cirrhosis [3], which shows that the number of individuals suffering from cirrhosis had increased. As a result, the medical community is faced with a series of issues which must be dealt with and which are especially relevant to various areas of surgery. Improved medical and supportive therapy, as well as improved training of healthcare staff, have increased the life expectancy of cirrhotic patients, and

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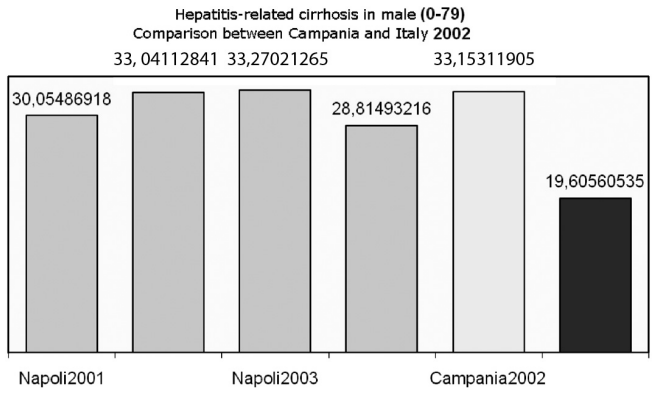
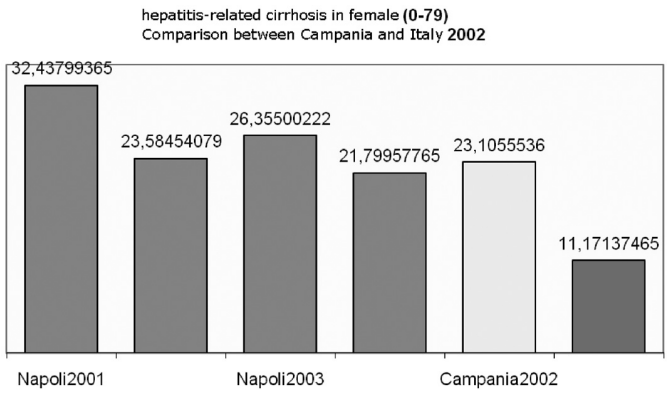
TABLE I - *Simonetti, Ortolani, Di Gennaro S.E.P. Asl Na 1.*



571	SMR	Standard error	Minimum incidence	Maximum incidence
Naples 2001	30,05	0,33	29,40	30,70
Naples 2002	33,04	0,35	32,36	33,72
Naples 2003	33,27	0,35	32,59	33,95
Naples 2004	28,81	0,33	28,16	29,46
Campania 2002	33,15	0,35	32,47	33,83

SMR=standardized mortality rate.

TABLE II - *Simonetti, Ortolani, Di Gennaro S.E.P. Asl Na 1.*



571	SMR	Standard error	Minimum incidence	Maximum incidence
Naples 2001	32,44	0,35	31,76	33,12
Naples 2002	23,58	0,28	23,03	24,14
Naples 2003	26,36	0,30	25,77	26,94
Naples 2004	21,80	0,28	21,25	22,35
Campania 2002	23,11	0,28	22,55	23,66
Italy 2002	11,17	0,20	10,78	11,56

SMR=standardized mortality rate.

therefore new surgical situations arise, for instance a more frequent need for abdominal hernia repair, which in the past was only performed if considered a surgical emergency. Technical and methodological innovations in anesthesiology, (the widespread diffusion of surgical procedures performed under local anesthesia being of special note in this context), and the perfection of techniques for prosthetic repair of abdominal hernias, together with specialist products, make it possible to approach such procedures in cirrhotic patients with concrete possibilities of obtaining good results.

Abdominal hernias occur very frequently in cirrhotic patients. Carbonell and colleagues, in an article published in 2005, reported that the incidence rate of abdominal hernias was >20% in patients who have long-standing cirrhosis, and 40% in cirrhotic patients with ascites [4]. Hepatic cirrhosis has always been a potential harbinger of a negative outcome in patients undergoing inguinal hernia repair [5-7].

The most common types of abdominal wall hernias in cirrhotic patients are umbilical and incisional hernias, followed by inguinal hernias. The latter pose a significant challenge to the surgeon. The principal problems of surgical interest caused by cirrhosis are coagulation defects, infection and delayed wound healing. The formation of abdominal hernias in cirrhotic patients is linked to increased intraabdominal pressure due to ascites, weakening of the abdominal wall due to changes in protein metabolism, and vascular changes associated with uncompensated portal hypertension [8]. If these hernias are left untreated, they can reach formidable dimensions and become painful, causing discomfort that affects patients'quality of life (QOL) [9] Moreover, they can be associated with skin necrosis, leakage of ascitic fluid, and bacterial peritonitis [4,10]. Currently, the goal of treatment, according to some authors [11,12] is to keep cirrhotic patients free of invalidating symptoms for as long as possible. The surgical approach to cirrhotic patients suffering from inguinal hernia, is, therefore, of extreme theoretical and practical interest. Besides surgeons, specialists in internal medicine/hepatology, and anesthesiology are involved, to varying degrees, in determining how best to treat and cure these patients. A multidisciplinary approach does not currently provide unequivocal indications that any procedure for inguinal hernia repair is specific and reliable for this particular type of patient. However, careful evaluation of clinical and laboratory parameters makes it possible to identify, with preliminary diagnostic tests, alterations in biochemical markers that are typical of cirrhotic patients. Once these have been stabilized and all parasurgical prophylactic measures taken, the patient is adequately prepared for surgery, even day-surgery, and has the same prospects for recovery as any non-cirrhotic patient [13]

At the Polyclinic of the II University of Naples, products to be used in conjunction with inguinal hernia repair with prosthetic mesh have been studied since 1994. In 1994, 37 patients with inguinal hernias who were considered to be at risk of complications were given prophylactic treatment with fibrin glue to promote hemostasis. In 1998, 14 cirrhotic patients undergoing inguinal hernia repair, were given various types of adjunc-

tive treatment (with fibrin glue, platelet transfusions, short-term antibiotic prophylaxis, and elastic compression), in 10 cases in day- surgery. Another case series, in 2005, consisted of 101 cirrhotic patients treated for abdominal hernias with the same clinical protocol as the previous series, (66 inguinal hernias, 21 umbilical hernias, and 14 incisional hernias), 16 of whom were day-surgery patients. During these years the technical ploy of not opening the hernia sac was introduced in order to avoid infiltration of ascitic liquid, which could ruin a successful operation by causing infection or delayed wound healing.

The aim of this study, conducted on 52 cirrhotic patients who underwent inguinal hernioplasty between January 2007 and January 2009, was to evaluate the effectiveness and safety of surgical treatment when certain parasurgical measures were used. These measures as indicated by the notes we inserted into our surgical protocol regarding technical procedures, included the following points:

1) Short-term antibiotic prophylaxis;
2) Perioperative transfusion of concentrated platelets;
3) Not opening the hernia sac;
4) Application of human fibrin glue;
5) Intraoperative elastic compression.

Preoperative stabilization of altered physiological and laboratory parameters is, of course, a key part of treatment, and should coincide with stabilization of liver function.

Materials and methods

Between January 2007 and January 2009, in the 10th Division of Surgical Oncology and Pathophysiology, part of the Department of General Surgery of the Polyclinic of the Second University of Naples, 52 cirrhotic patients with various stages of disease underwent prosthetic repair of inguinal hernia. Most were men (90.4%, 47 patients) and the average age was 63.5 years (range: 45-80 years). Fourteen patients (26.9%) had ascites, which was mild in 9 patients (17.3%), and moderate in 5 patients (9.6%). Forty-one patients (78.8%) had a unilateral hernia, and 11 patients (21.2%) had bilateral hernias, but underwent unilateral repair. As regards classification, 44 hernias (84.6%) were interstitial, and 8 (15.4%) were inguinoscrotal, 30 (57.7%) were indirect, 18 (34.6%) were direct, and 7.7% [4] were combined. According to Gilbert's classification, modified by Rutkow and Robbins, which subdivides hernias into 7 types, the range in our patient sample was 2-5 types [14,15].

We evaluated the functional indices of our 52 cirrhotic patients with inguinal hernias and also their suitability for surgery, by means of routine preoperative tests, including abdominal ultrasound, and in some cases gastroscopy. After evaluation of their metabolism and coagulation system, the patients were classified using the Child-Pugh score, with the following results: 37 patients (71.2%) were class A, 12 patients (23.1%) were class B, and 3 patients (5.8%) were class C.

Cross-matched platelet transfusions were given to 19 patients (36.53%) preoperatively (except in one case), intra- and postoperatively.

Approximately one hour before surgery antibiotics were administered endovenously (short-term antibiotic prophylaxis); 39 patients received ceftriaxone and 13 received amoxicillin/clavulanic acid. There were no cases of surgical wound infection.

Step-wise local infiltration anesthesia was induced with 40/80 ml of 1% carbocaine or 30/60 ml of 7% ropivacaine in 50 patients (96.2%) and spinal anesthesia was used for the other 2 patients (3.8%). There was no case of conversion to general anesthesia.

The key moments of the operation are when the hernia sac is identified, and then pushed back into the abdomen, in 51 patients (98.1%) without opening the sac and exposing its contents, and, in the case of direct hernias, imbrication of the transversalis fascia if necessary. Apposition of the polypropylene prosthesis was the next step. In 6 patients (11.5%) we used the Prolene Hernia System (PHS) (Ethicon®) with the Gilbert technique, while in the others we used an onlay polypropylene mesh prosthesis, for tension-free and sutureless Trabucco repair in 37 patients (71.2%), and for the Lichtenstein method with sutures in 9 patients (17.3 %), with or without a plug. In Trabucco repair, the procedure we used most often, we applied a single stitch to fix the prosthesis to the pubic tubercle.

After apposition of the prosthesis, and adequate control of hemostasis, we applied fibrin glue (2-5ml) (Tissucol® - Baxter) in all except 10 patients (19.2%), between the posterior part of the inguinal canal and the prosthesis, and along the funicular structures if there was extensive bleeding

Closure of the aponeurosis of the external oblique muscle under the funicular structures completed the repair. Immediately after surgery we usually applied adhesive elastic bandages (Thensoplast ®) to the area to provide compression. We also continued transfusions of platelets for about 2 hours postoperatively, in 19 patients. After 2 hours we discharged the day- surgery patients if anesthesiological and surgical discharge criteria were satisfied. Out of 52 patients, 27 (51.9%) had been admitted as regular patients and their average hospital stay was 3.1 days (range.2-7 days), while 25 (48.1%) were treated in day- surgery. None of the patients discharged on the same day they underwent surgery had to be readmitted and or had to make an unscheduled visit to the outpatients' department.

The characteristics of our sample are given in Table III. We analyzed the relationship between postoperative complications and the following: type of admission, hernia characteristics, presence or absence of ascites, Child Pugh

TABLE III - *Sample characteristics.*

Sample characteristics	**Number of patients**	**52**	
Age	Average age	63,5years	Range 45-80years
Sex	Male	90,4%	
Hernia type (location)	Unilateral	78,8%	
Hernia type (size)	Interstitial Inguino scrotal	84,6% 15,4%	
Hernia type (genesis)	Indirect Direct Combined	57,70% 34,60% 7,70%	
Type of cirrhosis	Viral	82,7%	HCV 75,0%
Type of operation	Mesh and plug Imbrication of trasversalis fascia and mesh Imbrication of trasversalis fascia 11,50% Mesh and plug	51,90% 36,50%	
Surgical procedure	Lichtenstein Prolene hernia system Trabucco	17,3% 11,5% 71,2%	
Sac not opened		98,10%	
Sequelae	Skin ecchymoses	34,60%	
Complications	Intraoperative Postoperative	0,0% 9,60%	
Type of complication	Serohematic congestion of spermatic cord Seromas Serohematomas Neuralgia	40% 20% 20% 20%	
Ascites		26,9%	
Type of ascites	mild moderate	17,3% 9,60%	
Transfusion of concentrated platelets trasfusion	Preop. Intraop. Postop	38,8% 36,53% 34,61% 34,61%	
Human fibrin glue		80,80%	
Pharmacological support		30,76%	Human Albumin; diuretics; K vit.
Type of anesthesia	Local Spinal	96,20% 3,80%	
Child- Pugh score preop.	A (5-6) B (7-9) C (10-15)	71,2% 23,1% 5,8%	
Day Surgery		48,1%	

TABLE IV - *Relationship between operative technique and complications.*

Surgical technique	**NO**	**YES**	**TOTAL**
Lichtenstein	7	2	9
Prolene hernia system	4	2	6
Trabucco	36	1	37
TOTAL	47	5	52

grade, type of prosthesis and surgical technique (Table IV), and adjunctive measures used. Statistical analysis was performed using the statistics software EPI INFO 3.5. A p-value < 0.09 was considered significant.

Results

In our series there was no mortality and there were no intraoperative complications of note. The postoperative complication rate was 9.6%. The complications were as follows. seromas/serohematomas, serohematic congestion of the spermatic cord, and postoperative neuralgia (one patient).
We consider ecchymosis part of the outcome, not a complication, since it is caused by surgical manonevers (use of retractors). It usually lasts 3-4 days, is not associated with subjective symptoms, and does not require specific therapy. Since ecchymoses were not counted as complications, we observed that in our series there was no relevant incidence of postoperative complications, neither in terms of frequency nor of severity.
Analysis of the complications showed that, in our series there was no statistically significant association with ascites (p=0.4462); no association with the number of hernias per patient (uni-or bilateral) (p=0.1441), or with the type of defect (p=0.1754),but that the association between complications and hernia size reached statistical significance (p=0.09293). Hernia reduction without opening the sac in order to prevent leakage of ascitic fluid and the resultant increase in the risk of wound infection had no statistical significance in our series, because in 51 patient the sac wasn't open. The type of prosthesis used did not seem to have significance when associated with postoperative complications. It is important to note that all the procedures were performed by the same surgeon. The technique used may have affected the complication rate. Presuming that no errors of technique were made, there were complication rates of 33% when the PHS technique was used, and 22% with the Lichtenstein repair, but only 2.7% with Trabucco repair (p=0.02336). However analysis of larger case series would be needed to confirm this. There were no substantial changes in Child – Pugh scores postoperatively, (Child class A:10.3%, Child class B:0,0% Child class C:33.3%), and the relationship between Child class and the complication rate was not statistically significant (P=0,1940). Analysis seems to indicate that Child class C patients have a higher rate of complications than others, but although our data is in agreement with the literature [8-10], we cannot claim that it has statistical significance. As regards adjunctive measures, the application of fibrin glue (Tissucol®, Baxter) was shown to reduce the complication rate to a statistically significant extent (p=0.02336), as was the transfusion of platelets (Table VI). Finally, the type of admission (regular inpatient or day surgery) did not have any significant effect on the complication rate.
The relationship between all postoperative complications and various factors associated with patients, operative technique, adjunctive prophylactic measures, and the type of hospital admission, is summarized in Table VII

Discussion

Even though our case series was small, analysis showed that cirrhotic patients suffering from inguinal hernia,can undergo inguinal hernia repair with prosthetic mesh, even in day-surgery, with excellent results, provided they have had a correct preoperative evaluation, plus medical

TABLE V - *Relationship between fibrin glue and complications.*

TISSUCOL	NO	YES	TOTAL
NO	7	3	10
YES	40	2	42
TOTAL	47	5	52

TABLE VI - *Relationship between platelet infusion and complications.*

PLATELETS	NO	YES	TOTAL
NO			33
YES			19
TOTAL	47	5	52

TABLE VII - *Relationship between postoperative complication and analyzed factors*

Patient:	
• Complications./Child class:	10,8% = a; 33,0% = c
• Complications./ascites:	20% =yes; 10,51% = no
• Complications./hernia type:	25% = bilateral; 13,3% = indirect.; 0% = direct.
Operation:	
• Compications/operative technique:	33% = prolene hernia system; 22% = Lichtenstein; 2,7%
Adjunctive prophylactic measures:	
Complications./platelet transfusion:	12,1% = no; 5,3% = yes complications./fibrin
glue:	30% = no ; 4,8% = yes
Admission:	
• Complications./type of admission:	8% = day-surgery; 11,1% = REGULAR

and, if necessary, surgical treatment of hemodynamic and other imbalances, and certain adjunctive measures and technical tricks are used. The main points of the treatment protocol we put together are as follows:

– Antibiotic prophylaxis: what we mean by preoperative antibiotic prophylaxis is the administration of antibiotics according to well-defined criteria, in order to prevent infection. The Center for Disease Control and Prevention in Atlanta defines short-term antibiotic prophylaxis in surgery as recourse to the administration of an antibiotic agent for a very short time just before surgery. In this case antibiotics are not used with intention to treat but to prevent [16-18];

– Preoperative transfusion of concentrated platelets: platelet infusions are problematic since platelets have a very short half-life and can cause transfusion reactions, and are sometimes hard to obtain, due to the well-known supply problems at blood banks. In any case, we have found it useful to administer 3-7 units of platelets, pre, intra- and postoperatively, to patients with a platelet count < 50.000, provided they have no transfusion reaction and depending on availability;

– Technique: the only difference in technique, aside from ensuring that complete hemostasis has been achieved, is not opening the hernia sac. The reason for this is to prevent leakage of ascitic fluid which would increase the risk of infection and delay wound healing It is important to note that patients who preoperatively only have mild ascites or none at all, might have more postoperatively, especially if they were discharged home and not seen afterwards by a hepatologist. It is therefore best to avoid opening the hernia sac in all patients with ascites or at risk of developing ascites, even though this sometimes entails increased bleeding. We observed increased bleeding in one of our patients, who had a long history of inguinoscrotal hernia, presumably because tenacious adhesions had formed between the sac and the funicular structures;

– Human fibrin glue (Tissucol® - Baxter) is without doubt a valuable adjunct to surgery as a measure against bleeding complications, and is therefore especially useful for cirrhotic patients with coagulation problems. This is easy to understand since the key biological property of human fibrin glue is its ability to facilitate hemostasis, by mimicking the advanced phases of the coagulation cascade, followed, due to the activation of growth factors, attraction of fibroblasts, and promotion of their replication,, by the reparative processes of fibrosis and angiogenesis. We must not, however, underestimate the other biophysical effects of the great adhesive capacity of fibrin glue, which, especially in sutureless techniques, ensures that there is no prosthesis dislocation in the immediate postoperative period. It is important not to forget the indirect effect that fibrin glue has in the battle against infection, due to its ability to fill dead space which might otherwise provide nourishment for bacteria. Fibrin glue, has been used for approximately 20 years in all areas of surgery, and its value in hernia repair and in cirrhotic patients undergoing major surgery is well established. Since cirrhotic patients are, par excellence, patients with coagulation deficits, and also more frequently affected by abdominal hernias than other individuals, we became interested in the possibility of using fibrin glue to benefit this rather large group of complicated patients. Adequate support for these patients includes the consideration that the application of fibrin glue not only facilitates hemostasis but, since the glue has biological properties (growth factors) that stimulate fibrosis and angiogenesis, could eliminate the risk of delayed fibrosis formation on the prosthesis, This risk is, theoretically, high due to the protein deficiencies typical of cirrhotic patients, which are one of the reasons they develop ascites [12];

– Compression with adhesive elastic bandages, applied at the end of the operation, from the pubis across to the anterior superior iliac spine, has a double purpose. Slight elastic compression ensures moderate vascular compression, especially in the superficial tissues, which are often the site of ecchymosis, but also, though less often, in the deep tissues. Moreover, it holds the repaired area

together like a sandwich made up of the anterior layer of the external oblique aponeurosis, the prosthesis, and the posterior wall of the inguinal canal, and solidified by human fibrin glue applied between the transversalis fascia and the prosthetic mesh. Since the prosthesis is made of three-dimensional mesh, the fibrin glue easily passes through the mesh and reaches the internal surface of the anterior layer of the aponeurosis, solidifying the whole structure. This is facilitated by slight elastic compression from the outside.

It is important to remember that our protocol can, in a large number of cases, be applied in day-surgery, when the patient is in optimal condition, with all the benefits associated with the same model of treatment that, in the case of cirrhotic patients, often undergoing outpatient treatment in infectious disease centers, are of such clinical, social, and administrative importance.

Conclusions

Table VII summarizes the best possible findings in a hypothetical cirrhotic patient suffering from inguinal hernia, who is a candidate for hernia repair and, thanks to technical advances made in recent years, can undergo diagnostic and treatment procedures as if he/she were not suffering from cirrhosis.
Based on our experience, we shall continue to use the protocol described here, since the results we have observed so far, have been very encouraging. Our methods are safe and easy to apply to inguinal hernia patients with severe comorbidity that puts them at a high risk of developing postoperative complications. Granted that our series was small and all 52 patients were treated in the same center by the same surgeon, the results still suggest that it is time to reject the tradition of operating on cirrhotic patients only in emergencies, to advocate a multidisciplinary treatment plan, and to remember that hernia repair in these especially complicated patients can be a simple procedure.

Riassunto

INTRODUZIONE: La cirrosi epatica ha sempre rappresentato una patologia già associata che rende l'atto chirurgico particolarmente rischioso nel paziente sottoposto a plastica erniaria. Le problematiche tecniche inerenti ai deficit propri della patologia di base riguardano il comparto emocoagulativo, il comparto infettivologico e quello riparativo-cicatriziale. Lo scopo dello studio è quello di valutare l'efficacia e la sicurezza di una metodologia chirurgica supportata all'utilizzo d specifici presidi parachirurgici che, nel nostro caso, sono stati antibiotico profilassi a breve termine, infusione perioperatoria di piastrine concentrate, non apertura del sacco, applicazione di colla di fibrina umana, compressione elastica intraoperatoria.
MATERIALI E METODI: L'età dei 52 pazienti arruolati, in prevalenza maschi (90,4%) è stata in media 63,5 anni. Di ogni paziente è stato rilevato il tipo di ernia (diretta o indiretta), la magnitudine dell'ernia (interstiziale o inguino-scrotale), la mono o bilateralità, la presenza o assenza e il grado di ascite e il grado di Child e le complicanze perioperatorie. In tutti i pazienti la riparazione erniaria è avvenuta con uso di protesi. Nessun paziente è stato operato in anestesia generale. Abbiamo valutato eventuali relazioni tra tasso di complicanza rilevate e presenza di ascite, tipologisa d'ernia (diretta o indiretta), magnitudine dell'ernia (interstiziale o inguino-scrotale)allo stato di Child, alla somministrazione di pappe piastriniche pre e post-operatorie alla tecnica chirurgica utilizzata, al tipo di protesi usata, all'apertura o meno del sacco erniario e all'applicazione di colla di fibrina umana oltre alla protesi.
RISULTATI: Nella nostra serie, a mortalità zero le complicanze postoperatorie sono state del 9,6%. L'analisi incrociata delle complicanze non mostra alcuna associazione statisticamente significativa con la presenza di ascite (p=0,4462), di monolateralità o bilateralità dell'affezione erniaria (p=0,1441), né per la tipologia di difetto (p=0,1754) ma con la grandezza dell'ernia (p=0,09293), con il tipo di tecnica usata (p=0,0228), e con l'utilizzo complementare di colla di fibrina ha invece significativamente ridotto il tasso di complicanze (p= 0,02336).
DISCUSSIONE E CONCLUSIONE: Il paziente cirrotico portatore di ernia inguinale, può, con un idoneo inquadramento preoperatorio ed il trattamento medico o medicochirurgico degli squilibri di base, insieme con l'adozione di alcuni accorgimenti di tecnica e l'uso di alcuni presidi complementari, essere sottoposto a plastica erniaria inguinale protesica, anche in regime di day surgery, con ottimi risultati. I punti sostanziali del protocollo di trattamento da noi messo a punto riguardano soprattutto i seguenti punti: antibiotico progilassi a breve termine, infusione perioperatoria di piastrine concentrate, non apertura del sacco, applicazione di colla di fibrina umana, compressione elastica intraoperatoria.

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