Safety and stability of inguinal hernia repair in Egyptian patients suffering from portal hypertension-associated ascites using ultrasound-guided nerve block

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Background
Inguinal hernia repair in patients suffering from liver disease-induced ascites may be a matter of controversy due to high vulnerability of these patients to stresses. Ultrasound (US)-guided local anesthesia is an effective and safe method that can be applied in such vulnerable patients, giving the surgeon a chance to assess feasibility and stability of hernia repair in such patients.
Patients and methods
Tension-free hernioplasty under a US-guided nerve block was performed for 14 patients with inguinal hernia-associated abdominal ascites due to portal hypertension (16 procedures) at the Department of Clinical and Experimental Surgery, Medical Research Institute, Alexandria University, from September 2013 to December 2015.
Results
There was neither operative-related mortality nor major complications during the follow-up period of 16.5 (9–24) months, with no reported recurrences for all patients.
Conclusion
Inguinal hernia mesh repair using an US-guided nerve block is a safe and effective procedure in patients suffering from liver diseases complicated by ascites.

Keywords:
ascites, inguinal hernia repair, portal hypertension, ultrasound-guided local anesthesia

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Introduction

Portal hypertension is a major health problem in Egypt. Among these patients, inguinal hernia is not uncommon, representing another problem in such high-risk patients. There is a controversy regarding whether elective hernia repair should be performed in these patients or not, as these patients show high vulnerability to stresses associated with surgery and anesthesia because of their limited liver reserve [1]. Noncomplicated inguinal hernia is not uncommon among patients with ascites. It might be expected that ascites would lessen the likelihood of incarceration and strangulation of inguinal hernias [2]. In the case of umbilical hernias, it has been reported that the pressure of the ascites fluid widens the base of the herniation and theoretically renders incarceration less probable, which may be the case in inguinal hernias [3]. The surgeon must assess the risk for perioperative complications and recurrence relative to the likelihood of complications from an untreated hernia in a patient who is often a poor medical risk [4].

Horn *et al.* [5] recommended managing inguinal hernia in these patients with caution and conservatively whenever possible because of an increased risk for significant perioperative complications such as infection, recurrence, and ascites leakage. Pere *et al.* [6] reported severe postoperative deterioration of the clinical condition of three patients with stable cirrhosis and controlled ascites who underwent elective inguinal hernia repair. However, Hurst *et al.* [2] reported that life-threatening complications from inguinal hernia repair in patients with cirrhosis and ascites are uncommon, attributing morbidity and long-term mortality rates in these patients to the progression of the underlying liver disease. Patti *et al.* [7] reported that quality of life of these patients improved remarkably after hernia repair, especially in patients of Child's class C and/or those with refractory ascites. Decades ago, local anesthesia was used in inguinal hernia repair but with a failure rate up to 40% [8]. Recent introduction of ultrasound (US)-guided techniques has increased the success rate up to 95% and significantly lowered the need for postoperative parenteral analgesics [8,9]. Elimination of the risks of general and spinal anesthesia may facilitate the decision of surgical repair in such high-risk patients, giving a chance to assess feasibility and stability of the procedure.

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Patients and methods

This study was a prospective analysis of 14 patients suffering from liver portal hypertension-associated with ascites admitted to the Department of Surgery, Medical Research Institute Hospital, University of Alexandria, Egypt, for elective management of associated symptomatic inguinal hernia between September 2013 and December 2015. The study protocol was approved by institutional review board and a consent form was signed by each patient before the operation.

All patients were first optimized in the hepatology unit regarding their clinical and laboratory aspects. Preoperative assessment of patients included history taking regarding their liver disease and ascites. Furthermore, onset, progress, and history of complications of inguinal hernia were discussed. Clinical assessment of signs of liver affection, degree of ascites, and inguinal hernia were recorded. According to US findings, ascites was classified into mild, moderate, or large. Preoperative diagnostic upper gastrointestinal endoscopy was carried out as a routine procedure for all patients to exclude esophageal varices. After laboratory investigations, patients were classified according to the Child–Pugh classification system. Patients were also classified according to The American Society of Anesthiologists (ASA).

Patients with ascites and symptomatic inguinal hernias (pain, discomfort, and history of irreducibility) were included in this study. The exclusion criteria for the study was as follows:

(1) Recurrent, complicated, and huge scrotal hernias.
(2) Patients refusing local anesthesia.
(3) Patients asking for synchronous bilateral hernia repair.
(4) Patients with refractory ascites who were nonresponsive to conservative measures.
(5) Morbid obese patients (BMI≥40).
(6) Associated comorbidities as precholemia, psychological disorders.
(7) Skeletal deformities interfering with local anesthesia.
(8) History of abdominal surgery on the same side of hernia.

Local anesthesia

All patients were subjected to an US-guided block by a well-trained anesthesiologist. All patients received premedication [intravenous fentanyl (0.5 μg/kg)] before performance of the block. After identification of the anterior superior iliac spine, a line was drawn extending from this point to the umbilicus. Ilioinguinal and iliohypogastric nerves lie in the fascial split between the internal oblique and transversus abdominis. Using US this fascial plain was identified, and after negative aspiration, 20 ml of 2.5% isobaric bupivacaine was infiltrated to block the nerves. Blocking of the genital branch of the genitofemoral nerve was achieved by identifying the external iliac artery and vein 1.25 cm above the inguinal ligament. At this point the inferior epigastric artery was traced and the needle tip was located at the lateral vicinity of the inferior epigastric artery, where 10 ml of 0.5% isobaric bupivacaine was infiltrated after negative aspiration. This was reinforced by intraoperative infiltration of a local anesthetic into the pubic tubercle and its surrounding area. Further local infiltration around the neck of the hernia sac and deep ring area was done if needed. Simultaneously with the blockade, dexmedetomidine was infused at a loading dose of 1 μg/kg for 10 min, followed by infusion at a rate of 0.6 μg/kg/h until termination of the surgical procedure.

Surgical technique

After optimization of the clinical and laboratory aspects of the patients in the hepatology unit, they underwent tension-free hernioplasty using a 6×11 cm prolene mesh.

Postoperative assessment

Patients were assessed for early complications. To detect recurrences, clinical and laboratory assessment were carried out on the second postoperative day and then every month.

Results

The study involved 14 patients with 16 inguinal hernia repairs, as two of them presented with bilateral hernias and were subjected to sequential repair. The interval between the two procedures was 6 and 8 months, respectively. For simplification we considered them as 16 patients. All patients were men with a mean age of 44.3±9.5 (34.5–52.5) years and a mean BMI of 28.4±3 (26.5–33.7) kg/m^2. According to the ASA score, nine (56.25%) patients were of ASA II, five (31.25%) patients of ASA III and two (12.5%) patients of ASA IV. According to the immediate preoperative Child–Pugh classification, 11 (68.75%) patients were Child B and five (31.25%) patients were Child C. Eight (50%) patients presented with small ascites, six (37.5%) patients with moderate, and two (12.5%) patients with large ascites. The complaints of hernia was for a mean period of 11±4 (3–17) months. Four patients gave a history of at least one attack of irreducibility and the others complained of

abdominal colic, dyspepsia, and inguinal pain and discomfort. Seven patients presented with left-sided hernia, five with right-sided hernia, and two with bilateral hernia. The two bilateral cases were of indirect type. Associated comorbidities revealed four cases with diabetes mellitus, three cases with medical nephropathy, two cases with cardiovascular disorder, and two cases showed benign prostatic hyperplasia but with only mild nonobstructive urological manifestations. Endoscopy revealed presence of esophageal varices requiring rubber banding in seven patients and different degrees of hypertensive gastropathy requiring medical therapy in 14 patients (Table 1).

Operative and postoperative criteria

The mean surgical time was 62±12 (50–95) min, not including the time required for US-guided block. All patients were tolerating oral feeding after 6 h. Twelve (75%) patients asked for at least one dose of intravenous analgesics after surgery. Mean postoperative length of hospital stay (LOS) was 2.6±0.7 (2–7) days. The need for blood and blood products was as follows: all patients required intraoperative or immediate postoperative fresh frozen plasma transfusion, five required intraoperative platelets transfusion, and another five patients needed transfusion of packed red blood cells. Early postoperative complications were encountered in 12 cases: two (12.5%) patients with wound seroma, two (12.5%) patients with hematoma, three (18.25%) patients with superficial wound infection, four (25%) patients with scrotal edema, and one (6.25%) patient with both scrotal edema and wound infection (Table 2).

Table 1 Demographics of patients

Variables	Value
Age (years)	44.3 (34.5–52.5)
BMI (kg/m^2)	28.4 (26.5–33.7)
Sex	
Male	16 (100)
Female	00 (00)
ASA	
II	9 (56.25)
III	5 (31.25)
IV	2 (12.50)
Child–Pugh classification	
B	11 (68.75)
C	5 (31.25)
Ascites	
Small	8 (50)
Moderate	6 (37.5)
Large	2 (12.5)
Hernia type	
Indirect	14 (87.5)
Direct	2 (12.5)
Hernia side	
Right	5 (31.25)
Left	9 (56.25)
Bilateral	2 (12.5)

Values are presented as mean (range) or *n* (%). ASA, American Society of Anesthesiologists.

Clinical, laboratory investigations and the Child–Pugh classification on postoperative days 2 and 30 showed no changes compared with the immediate preoperative status (Table 3). Mean period of follow-up was 16.5±4.5 (9–24) months, during which none of the patients showed recurrence. Three patients died because of recurrent massive upper gastrointestinal bleeding and liver failure.

Discussion

Basically, all cases of indirect inguinal hernia should be surgically managed once possible. However, the case of patients suffering from a liver disease complicated by ascites may be different not only because of the patients' high vulnerability to stresses but also because of the question about feasibility and stability of repair in such patients with persistent high intra-abdominal pressure and poor healing power [1,10]. In particular, the presence of ascites in a patient with a groin hernia greatly complicates the decision-making process necessary to provide optimal care [2].

Such patients were previously referred to our department; however, the decision of surgery even in elective cases was not easy due to expected high risks of anesthesia. Introduction of the US-guided local anesthesia technique alleviated the risk for general and spinal anesthesia, and hence it was the time to assess feasibility and stability of hernia repair in such patients. In this study, 16 elective inguinal hernia procedures were carried out using on-lay tension-free mesh repair.

Ideally, patients with cirrhosis should undergo elective hernia repair after medical optimization

Table 2 Operative and postoperative criteria

Variables	Value
Mean surgical time (min)	62±12 (50–95)
Length of stay (days)	2.6±0.7 (2–7)
2	11 (68.75)
3	3 (18.75)
≥4	2 (12.5)
Early postoperative complications	
Seroma	2 (12.5)
Hematoma	2 (12.5)
Infection	3 (18.8)
Scrotal edema	4 (25)
Scrotal edema and infection	1 (6.3)

Values are presented as *n* (%) or mean±SD (range).

[11]. Franzetta *et al.* [12] reported significant preoperative risks and postoperative complications in cirrhotic patients undergoing elective or emergent operations in the presence of tense ascites, low albumin level, prothrombin time, or activated partial thromboplastin time, showing significant associations with mortality rates of 7.1% in Child's class A, 23% in class B, and 84% in class C. Thus, an integral part of this study was the aid of hepatologists to control and minimize the amount of ascites and try to correct the disturbed laboratory aspects. It took from 2 days to 4 weeks to get the most optimal clinical and laboratory aspect. Patients with ascites were recommended to a salt restricted diet, diuretics, and plasma transfusion. These measures were sufficient to control and decrease the amount of ascites and lower-limb edema if present. Abdominal paracentesis was not indicated in the preoperative preparation. Longer periods of preparation were required for endoscopic management of detected varices requiring one or two sessions of endoscopic band ligation. Patients who presented with refractory ascites were excluded from this study, as refractory ascites is associated with poor prognosis in patients with cirrhosis and is an indication for liver transplantation [1]. In patients who concurrently have refractory ascites and an inguinal hernia, elective surgery can also be performed before liver transplantation or along with liver transplantation [5,13]. The average operative time was 62±12 (50–92) min; the least time was needed for cases of direct hernia, whereas more time was needed for cases of complete inguinoscrotal hernia as it required more dissection of the sac. In addition, the accidental tears of thin sacs and leakage of the ascites fluid is another point that may affect the operative time. For this point, it is preferred not to dissect the sac down to its fundus and it is enough to identify the sac and transect it to deal with the proximal portion as usual while the distal part is just longitudinally incised and fixed after eversion to be left in place. For the occasional tears of the sac, it is not preferred to handle the site of leak with an instrument as it may cause more damage to the sac, but application of compression and the use of meticulous suture repair of the site of tear will be sufficient to control leak and time.

Need for intraoperative transfusion of blood and blood products was determined by the preoperative clinical and laboratory status. All of the patients required fresh frozen plasma transfusion to manage low serum protein level, low prothrombin activity, and to replace ascites fluid leakage due to torn sacs. However, the preoperative optimization of such patients is still the key point for better management.

Although inguinal hernia repair is considered a day surgery, the mean postoperative LOS in this study was 2.6±0.7 (2–7) days. This prolonged LOS for an inguinal hernia repair can be attributed not only to the need for ascites control but also to research purposes, as all the patients were observed for at least 2 days to detect and manage early complications in addition to assess clinical and laboratory status before discharge to be compared with the preoperative status. Actually, the 11 (68.75%) and three (18.75%) patients discharged on day 2 and 3, respectively, after surgery could have been safely discharged earlier than that. Two cases needed to be admitted for at least 4 days. One case with an evacuated hematoma was discharged on day 4, whereas the other one was discharged on day 7 for better control of ascites. Similar results were reported by Hur *et al.* [1] with LOS of 1.8 days. Seventeen (77.3%)

Table 3 Preoperative and postoperative clinical and laboratory assessment

Variables	Immediate preoperative	Postoperative day 2	Postoperative day 30
Ascites			
Small	8 (50)	7 (43.75)	7 (43.75)
Moderate	6 (38)	7 (43.75)	8 (50.00)
Large	2 (12)	2 (12.50)	1 (6.25)
Laboratory tests			
Hemoglobin (μg/dl)	9.2 (8.5–10.5)	9.3 (8.8–10.3)	9.2 (8.2–10.5)
Platelet count (1000/μl)	92 (39–267)	93 (35–280)	92 (42–270)
Total bilirubin (mg/dl)	2.3 (1.9–4.3)	2.4 (1.8–4.5)	2.4 (1.9–4.3)
Creatinine (mg/dl)	1.4 (0.9–2.3)	1.4 (0.9–2.5)	1.6 (1.1–2.5)
Albumin (g/dl)	2.9 (2.6–3.3)	3.0 (2.9–3.5)	2.9 (2.4–3.5)
International normalized ratio	1.34 (1.16–1.43)	1.29 (1.20–1.39)	1.3 (1.18–1.51)
Child–Pugh classification			
Child B	11 (69)	11 (69)	11 (69)
Child C	5 (31)	5 (31)	5 (31)

Values are presented as *n* (%) or mean (range).

patients were discharged the day following the surgery. Two (9.1%) patients were discharged on day 2, one patient was discharged on day 2, and one patient who was discharged on day 10. They attributed the prolonged length of hospital stay to the need for ascites control [1].

In this study no early postoperative mortality or life-threatening complications were reported up to day 30 after the surgery. Local complications were reported as 12 events. Two patients presented with mild seroma, detected on postoperative days 3 and 5, and required one or two trials of aspiration, either during admission or as an outpatient procedure. Two Child C patients presented with hematoma immediately after the surgery. Only in one of these patients, hematoma required blood and plasma transfusion associated with evacuation under local anesthesia, which was a successful procedure with no definite source of bleeding detected, whereas the other case was successfully managed using conservative measures. Although mild scrotal edema can occur following a large inguinoscrotal hernia repair, in this study five (31.25%) patients presented with a mild degree of scrotal edema and one of them presented with both scrotal edema and superficial wound infection but none of them complicated by scrotal skin ulceration or infection. This complication was precipitated by varying degrees of hypoalbuminemia and resolved over a period ranged from 2 to 4 weeks using traditional oral and local antiedematous measures in addition to repeated plasma transfusion in cases with marked hypoalbuminemia. Three patients presented with mild superficial mild infection noticed a few days after surgery. Two of these patients were diabetic and all of them were successfully managed using oral antibiotics up to 7 days. Although there were numerous local events, none was life-threatening and all of them were properly managed without marked impact on life.

All patients were operated under US-guided local anesthesia and direct infiltration into the area surrounding the pubic tubercle. Five patients who experienced pain during traction and dissection of the sac were subjected to further direct infiltration of 5 ml bupivacaine around the neck of the sac and the internal ring was also made. Additional intravenous sedation using dexmetomidine was required in all patients. No anesthesia-related complications were reported and no significant clinical or laboratory changes were detected on day 2 after the surgery. Five more patients showed relative improvement in their laboratory investigations on postoperative day 2 compared with their preoperative status. This improvement was not sufficient to change their Child class, and can be explained by the proper perioperative management of these patients. Although numerous early postoperative local complications were detected, there were no mortality cases or changes in Child classes on postoperative day 30. After 16.5±3 (9–24) months of follow-up no hernia recurrences were reported; three cases died, two of them because of progressive liver failure and the third because of recurrent massive upper gastrointestinal bleeding. Similarly, Hur *et al.* [1] reported successful 22 inguinal hernia repairs in Child B and C patients using step-by-step local anesthesia infiltration with no major complications or recurrence. They reported only two cases with hematomas and one case of scrotal swelling [1]. Patti *et al.* [7] reported no major complications after hernia repair for symptomatic inguinal hernias in 32 patients with cirrhosis, and concluded that inguinal hernia repair is a safe procedure for the treatment of symptomatic inguinal hernia in patients with cirrhosis. In a series of 18 patients with cirrhosis accompanied by ascites and groin hernia, Hurst *et al.* [2] reported that 11 patients of them underwent groin hernia repair (a total of 13 repairs). Although there were no deaths or major postoperative complications, they reported one recurrence 11 months after repair. This recurrence may be explained by the fact that it was done as an urgent procedure using the Bassini technique.

Conclusion

Elective inguinal hernia repair in selected patients suffering from liver disease associated with ascites can be safe and effective using US-guided local anesthesia. The safety and efficacy can be improved by proper preoperative optimization of the clinical and laboratory aspects of the patient and by meticulous surgical technique with no need for prolonged postoperative hospital stay.

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Conflicts of interest

There are no conflicts of interest.

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