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We would like to thank you for reviewing our manuscript, “Indirect inguinal hernia containing portosystemic shunt vessel: a case report”. We appreciate the opportunity to revise the manuscript according to the recommendations of the reviewers. Please find below our responses to those comments, together with any corrections. We have reorganized the manuscript after due consideration of the recommendations; all changes to the text written in red. Please contact me if you have any questions.

Sincerely,

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Reviewer #1:

Abstract. The abstract is a mostly accurate summary of the case. However, in the case summary, I would appreciate if the authors would add the fact the existence of the shunt was known before the current clinical investigation. This explains why a CT was performed despite the very typical clinical findings.

Thank you for your important comment. We added the comments as below. (P2; L12)

Abdominal-pelvic computed tomography revealed a right inguinal hernia containing an expanded portosystemic shunt vessel, which had been noted for 7 years due to liver cirrhosis.

Discussion. Whether these findings support the routine use of CT in the diagnosis of inguinal hernia in patients with liver cirrhosis is doubtful. Perhaps US could be sufficient?

Thank you for your important comment. Since the ultrasound is a local finding, the continuity of the shunt vessel cannot be visualized. Therefore, CT examination is very useful for imaging shunt vessels. However, as the reviewers say, CT examination is not necessary in all cirrhosis cases, so the conclusion was changed as follows. (P2; L21-24, P9; L20-23)

If an inguinal hernia patient has portal hypertension, ultrasound should be used to determine the contents of the hernia. When atypical vessels are visualized, they may be shunt vessels and additional computed tomography is recommended to ensure the selection of an adequate approach for safe hernia repair.

Additional comments Below, I have listed a few additional questions and comments for the authors:

a) In the introduction section, please give a short outline of how an inguinal hernia would typically be diagnosed in a patient with liver cirrhosis, according to current international guidelines. And in the discussion section, please explain how the findings of the present study may suggest the need for an alternative approach.

According to the International Hernia Guidelines, US is now widely available but rarely magnetic resonance imaging (MRI), CT and herniography may play a role as well. Also, there is no description of additional recommended tests for patients with liver cirrhosis. However, we believe that patients with cirrhosis should undergo US to screen for the presence of atypical blood vessels associated with inguinal hernia and should undergo contrast-enhanced CT if atypical blood vessels are suggested by US. Contrast-enhanced CT scans provide reliable visualization of blood vessels and are recommended for safe surgery in these cases.

Comments on the above were added to the discussion. (P8; L23-P9; L2)

b) Do the authors believe that the findings of the present study justify the routine use of CT for the diagnosis of hernias in patients with suspected portal hypertension, given the radiation dose and financial costs this entails? Or could US be sufficient?

Since US can visualize a local finding, it is difficult and inadequate to diagnose a shunt vessel by US alone. Considering the cost and exposure dose, it may be more reasonable to add CT when the US shows an unusual blood vessel associated with inguinal hernia. Thus, our conclusion was also changed as follows.

If an inguinal hernia patient has portal hypertension, ultrasound should be used to determine the contents of the hernia. When atypical vessels are visualized, they may be shunt vessels and additional computed tomography is recommended. Careful preoperative diagnosis is important to ensure the selection of an adequate approach for safe hernia repair.

C) Which type of anesthesia was used? Did the unusual preoperative imaging findings influence the choice of anesthesia?

It was performed under general anesthesia as in a normal hernia. The presence of shunts did not affect the choice of anesthesia method.

d) Did the patient receive any perioperative treatment different from the conventional regimen? If so, which?

No, he didn't. The same perioperative management as for normal hernias was performed.

e) The authors chose to perform a Lichtenstein repair, which was obviously an appropriate choice. Did the authors at any point consider any alternative open approach?

At our hospital, we use the Lichtenstein's method for all male hernia patients when the open method is selected. Therefore, there was no other option for us.

f) In accordance with the CARE checklist item 11c, please elaborate on how this case report may suggest a testable hypothesis.

We believe that patients with cirrhosis should undergo AUS to screen for the presence of atypical blood vessels associated with inguinal hernia and should undergo contrast-enhanced CT if atypical blood vessels are suggested by AUS. Contrast-enhanced CT scans provide reliable visualization of blood vessels and are recommended for safe surgery in these cases.

g) The authors have listed 12 contributing authors for this case report. That is a lot of authors for a case report, and more than many other journals allow for this study type. I would appreciate a more detailed statement of author contributions to justify this number of authors.

Yura M and Yo K performed the surgery and wrote the paper; Nakagawa M reviewed the manuscript; All other authors equally contributed to medical treatment; All authors were responsible for the revision of the manuscript and final approval for submission.

h) Please add an additional figure with a timeline illustrating the patient's course of treatment, in accordance with the CARE checklist item 5.

We made timelines as figure 6.

i) Why was reference [1] chosen? I do not believe that the findings of the referred study support the statement made on page 4 line 1-2 of your manuscript.

We changed the reference.

j) Please consider adding one or both of the following references and give a short explanation in the discussion section of how these cases differ from the present: Zahir M, Al Muttairi HR, Upadhyay SP, Mallick PN. Unilateral Giant Varicocele Mimicking Inguinal Hernia Resulting from Portosystemic Shunt without Evidence of Portal Hypertension: An Unusual Case Report. Case Rep Surg. 2013;2013:709835. doi:10.1155/2013/709835. Afzal S, Nair A, Grainger J, Latif S, Rehman AU. Spontaneous thrombosis of congenital extrahepatic portosystemic shunt (Abernethy malformation) simulating inguinal hernia incarceration. Vasc Endovascular Surg. 2010 Aug;44(6):508-10. doi: 10.1177/1538574410373666.

We added these references and give a short explanation in discussion as below.

Muhammed et al.[11] reported unilateral varicocele mimicking inguinal hernia which showed painless compressible soft swelling of inguinoscrotal region, and Samara et al.[12] also reported thrombosis of congenital portosystemic shunt simulating inguinal hernia incarceration. From these cases, including our case, port systemic shunt deviation similar to inguinal hernia should be considered as a differentiation of inguinal swelling. However, one of the other two cases received only anticoagulant therapy for thrombosis, and the other did not undergo intervention at the patient's request. Only our case is accompanied by intestinal prolapse and has been successful treatment with surgical intervention for inguinal hernia. (P8; L13-21)

Reviewer #2:

The manuscript is interesting and has good quality figures. There are no referens to the statment that CT AND ultrasound should be performed in all patients with portal hypertension and hernia. The fact that both CT and ultrasound was important in the pre-operative evaluation of this specific case does not mean that permfroming both CT and ultrasound is always necessary in all case of portal hypertension and hernia. (Safety and effectiveness of inguinal hernia repair in patients with liver cirrhosis: a retrospective study and literature review, <https://doi.org/10.1007/s10029-019-02087-4>)

According to the International Hernia Guidelines, US is now widely available but rarely magnetic resonance imaging (MRI), CT and herniography may play a role as well. Also, there is no description of additional recommended tests for patients with liver cirrhosis. However, we believe that patients with cirrhosis should undergo US to screen for the presence of atypical blood vessels associated with inguinal hernia and should undergo contrast-enhanced CT if atypical blood vessels are suggested by US. Contrast-enhanced CT scans provide reliable visualization of blood vessels and are recommended for safe surgery in these cases. However, as the reviewers say, CT examination is not necessary in all cirrhosis cases, so the conclusion was changed as follows (P2; L21-24, P9; L20-23). And we added your recommended article as reference.

If an inguinal hernia patient has portal hypertension, ultrasound should be used to determine the contents of the hernia. When atypical vessels are visualized, they may be shunt vessels and additional computed tomography is recommended to ensure the selection of an adequate approach for safe hernia repair.

Reviewer #3:

There are not that many in the literature of these unusual portosystemic shunts. I think it would a good idea to mention another case in the literature that's very similar. In figure 1 image A, the right gonadal vein can be seen very dilated immediately anterior to the right psoas muscle just posterior to the shunt. I would have expected the patient to present and complaint also of varicocele in the right scrotum. But the case does not specify that ??it only mentions that there were small venous branches communicating the shunt with the spermatic vein. Did cutting them result in any brisk bleeding requiring ligation?? The conclusion recommends abdominal ultrasound and abdominal CT for preop evaluation prior to hernia repair in patients with portal hypertension. how about scrotal ultrasound? I can understand the abdominal CT, but routine abdominal US does not take that area into consideration unless it is a targeted study. " Unilateral Giant Varicocele Mimicking Inguinal Hernia Resulting from Portosystemic Shunt without Evidence of Portal Hypertension: An Unusual Case Report. Case Rep Surg. 2013; 2013: 709835."

There were no testicular varicose veins in the distal spermatic cord. Computed tomography also showed no varicose veins in the testes. After ligation, no bleeding was observed that made it difficult to stop bleeding.

When diagnosing inguinal hernia, we include the testis in the imaging range in order to exclude other diseases of the inguinal region and diseases around the testis. In this case as well, CT imaging was performed including the testis, but no testicular varicose vein was visualized around the testis. And we added your recommended article as reference.