CLINICAL COMMENTARY

Blunted Safety Paracentesis Catheters vs. Traditional Paracentesis Catheters on a Teaching Service

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Background & Introduction

"Competence in performing ambulatory and hospital-based procedures is integral to the practice of high-quality internal medicine".[1] With the growth of procedural services, especially interventional radiology, and limited procedural training provided by most internal medicine residents has led to decreasing number of resident performed procedures. The ABIM has concurred, decreasing requirements for procedural training. Increased patient safety initiatives and reduced procedural training has continued the decrease in performing previously routine common bedside procedures.[2,3]

Once recent change is recommending use of blunt ended safety catheters for paracentesis. We believe this change resulted in increased complications due to the larger incisions needed to introduce the blunt catheter tip into the peritoneal space. Complications include increased ascitic fluid leakage, increased patient discomfort, and increased nursing calls to manage ascitic fluid leakage. The blunt ended safety paracentesis catheters are intended to decrease risk of bowel perforation and hemoperitoneum by reducing risk of tearing of vascular structures. The original aim of this study was to examine evidence comparing traditional paracentesis catheter usage compared to blunt ended catheter usage. Initial PubMed and Google Scholar identified no current available data or studies on the efficacy or safety of these blunt ended catheters compared to traditional sharp tipped catheters.

We will also comment on procedural training pertaining to management of cirrhotic patients, discussing current utilization of paracentesis. Additionally, we will review guidelines for use of ultrasound and blood products in the thrombocytopenic, coagulopathic cirrhotic patients.

The most common severe complication from paracentesis is puncture of the intra-abdominal wall vessels. In particular, puncture of the inferior epigastric vessels which run parallel but deeper to the rectus sheath can result in hypotension and shock.[4] However, our impression is, internal medicine trainees most commonly fear bowel perforation. Due to trainee discomfort, it is now more common to perform diagnostic and therapeutic paracentesis on our patients beyond the recommended 6–12-hour window from admission.[5]

Clinical Case

A 64-year-old male with advanced Child Pugh Class (CPC) C cirrhosis, with a Model for End-stage Liver Disease (MELD) score of 27, was brought to the emergency department (ED)for dyspnea, progressive abdominal distention and volume overload. He was noted to have acute hypoxemic respiratory failure requiring BiPAP, severe acute respiratory acidosis requiring BiPAP, pending intubation. The admitting emergency department has a policy of not performing ED paracentesis due to overcrowding concerns. The patient was awaiting intensive care unit (ICU) admission for impending intubation. We noted abdominal distention with shifting dullness. The admitting resident team did not have paracentesis privileges and consulted MICU team for admission and intubation with interventional radiology (IR) to perform the paracentesis after intubation. The inpatient proceduralist team was consulted after interventional radiology deferred ultrasound guided paracentesis due to elevated INR of 2.2 and thrombocytopenia of 40k. Fresh frozen plasma (FFP) and platelet transfusion was requested prior to paracentesis. We performed a large volume paracentesis (LVP) of 8L with concurrent IV infusion of 25% albumin infusion. The patient's acute hypoxemic respiratory failure and respiratory distress resolved immediately and he was discharged from the ER with follow-up with his hepatologist with scheduled outpatient paracentesis.

Discussion

With continued decrease in internal medicine trainee exposure to procedures and decreasing procedural confidence, an increasing number of procedures have been deferred to interventional radiologists and other medical subspecialties. This may result in clinically significant delays in care.[3,4] Paracentesis is a commonly performed inpatient bedside procedure. It is essential to the diagnosis, prevention and treatment of spontaneous bacterial peritonitis, decompensated cirrhosis, volume management and respiratory sequelae in cirrhotic patients.[6] However, it is increasingly common for paracentesis to be deferred to interventional radiology due to the lack of comfort in performing bedside procedures. They may also be delayed for correction of thrombocytopenia and coagulopathy. IR paracentesis commonly has goals of INR <1.5 and platelet counts to be above 50,000. Current safety data and guidelines suggest bedside paracentesis can be done safely with INR as

high as 2.5 and platelet counts as low as 25,000.[7,8] Delays in paracentesis in cirrhotic patient at high risk of SBP results in higher morbidity and mortality increasing length of stay, increasing ICU transfers, and risk of decompensation.

Barsuk, Cohen, & Feinglass et al reviewed medical record and concluded the decision by medicine house staff and attendings to pursue IR or bedside paracentesis is usually arbitrary and determined by procedural competency and level of comfort in the medical team.[7] Hicks et al compared the number of bedside procedures done before the 1988 Clinical Laboratory Improvement Amendments (CLIA) which standardized procedures to increase safety and reduce complications. The ABIM also increased the number of procedures needed for residents to be considered competent. This resulted in a continued decline in performing common bedside procedures (see Figure 1).[1,3] Other theorized reasons for the decline is splitting duties between primary care internists and hospitalist internists, with relatively low compensation and increased risk of complications and time required, hospitalists were performing fewer bedside procedures than their internist counterparts in the 1980s.[3]

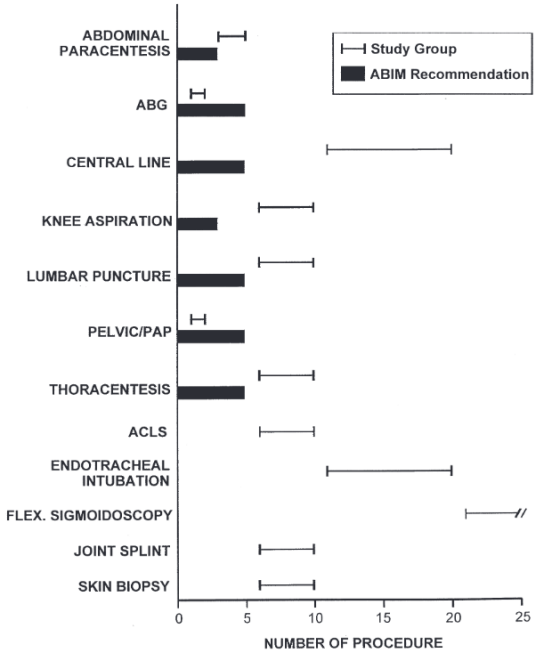

Figure 1. - Hicks et. Al, among 5 internal medicine programs the number of procedures that respondents needed to feel competent in performing procedures. Survey took place between December 1998 and May 1999.[1]

This continued declined is reflected in the ABIM proposals in 2019 defer procedural training to the discretion of program directors across the United States, with "respective programs to maintain procedural competency where appropriate."[9]

Expedited diagnostic paracentesis within six hours are recommended for patients admitted for decompensated cirrhosis to rule out spontaneous bacterial peritonitis with high mortality and morbidity.[10] Kim et. al, reported stepwise increase in mortality and morbidity in 6 hour increments. Our experience attending on inpatient medicine services is limited paracentesis expertise with deferral to either a procedural service or interventional radiology. Coagulopathy and thrombocytopenia may raise concerns for the IR staff, and with delays of more than 24 hours from presentation.[7,10] The American Association for the Study of Liver Diseases (AASLD) states correction of coagulopathy and thrombocytopenia is not required.[6]

Up to 12% of ascites results in SBP, thus timely paracentesis is important to prevent morbidity and mortality. Kim et. al, reported mortality in patients who received paracentesis within <6 hours, 6-11 hours, 12-23 hours, 24-48 hours, and >48 hours. They found a stepwise increase in mortality associated with time to paracentesis due to delayed diagnosis of spontaneous bacterial peritonitis.[10] This increase persisted after adjusting for MELD and creatinine levels. Hospital mortality increase 2.7 times when paracentesis was not done per guidelines. Every hour delay in paracentesis was associated with 3% increase in mortality due to SBP.[10] Only half of the patients meeting criteria for diagnostic paracentesis received timely paracentesis, and only 64% of patients with large volume paracentesis had concurrent albumin administration. A significant number of patients developed hepatorenal syndrome and acute kidney injury post large volume paracentesis with MICU transfers and increased mortality.[5]

Hepatology guidelines for management of ascites and cirrhosis show no major bleeding in patients with platelets below 50,000 and INR in the 1.5-2.0 range. The most common house staff fear is bowel perforation, however, most common cause of mortality, was abdominal wall hematomas. Mortality was 1% in both coagulopathic thrombocytopenic patients and patients without coagulopathy and thrombocytopenia. Multiple studies report less than 0.1% rate of bowel entry and or hemoperitoneum.[11] Based on expert opinion, the most important periprocedural marker of bleeding risk is serum creatinine. Uremic platelet dysfunction is more important than quantitative thrombocytopenia and abnormal INR. Additionally, INR alone is not a good indicator of platelet dysfunction in cirrhotic patients due to the concurrent dysfunction in prothrombotic and anticoagulant branches of the coagulation cascade.[11]

Grabau et. al showed trained registered nurses safely performed 612 outpatient LVP paracenteses in patients with mild coagulopathy as defined as an INR range in the 1.4 – 2.0 range with concurrent thrombocytopenia in the 40,000 – 50,000 range. No significant bleeding was noted, without coagulopathy correction. The only complication was relative orthostatic hypotension that self-resolved within an hour post procedure. All 612 paracenteses were done without concurrent bedside ultrasound.

Barsuk & Cohen et. al reported that simulation provided a safe practice venue for trainees and internists to practice their skills. All simulation attendees reported increased comfort performing bedside paracentesis after basic paracentesis simulation.[12]

Conclusion

In cirrhosis and ascites management and diagnosis that the availability of trained house staff and in Housestaff and attendings trained in bedside paracentesis are important in decreasing complication rates and expediting timely care to decrease length of stay and improving mortality and morbidity in patients with ascites. Although the commonly stated reason for use of blunt end paracentesis catheters is abdominal wall hematoma. Further study is needed to compare safety of the types of two catheters used in bedside paracentesis.

With increased training of physicians to perform bedside paracentesis, expedited paracentesis is essential in caring for cirrhotic patients. Older procedures such as cardioversions, pericardiocentesis and intubations are less commonly needed, we suggest the ABIM identify essential procedures that are necessary to modern hospital practice to identify any gaps in care, increase simulation training development of inpatient medicine proceduralist teams, and revise core procedural competencies in training programs.

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