case-based conundrums in liver cirrhosis

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Choose your own adventure…
Adventure 1
The squirter

HARVEY 62M
1: The Squirterter

**HPI**

- Harvey Miner, 62M.
- History of Hep C with cirrhosis, ascites after remote needle exposure.
- Umbilical hernia has been getting larger and leaking for past 3 days.

**Exam**

- Obese male, appears mildly uncomfortable
- Protuberant abdomen with +fluid wave and tenderness generally over abdomen.
- Large umbilical hernia that is difficult to reduce due to ascites. + Erythema and small scab noted over hernia.

- T 37.9C  HR 103  BP 90/60  O2 98% RA
1: The Squirter
1: The Squirter

You place some orders and move on to seeing your next patient when you get a phone call from the nurse requesting you in Harvey’s room STAT...
1: The Squirter

It’s your Choice……Should we……

1) Try to stop the leakage by throwing a figure of 8 stitch
2) Place an ostomy bag over the wound to collect ascitic fluid
3) Start broad-spectrum IV antibiotics and call a surgeon
4) Create a pressure bandage and send the patient for CT imaging
Try to stop the leakage by throwing a figure of 8 stitch

Place an ostomy bag over the wound to collect ascitic fluid

Start broad-spectrum IV antibiotics and call a surgeon

Create a pressure bandage and send the patient for STAT CT imaging
1) *Try to stop the leakage by throwing a figure of 8 stitch*

You throw in a figure of 8 stitch and the patient begins bleeding significantly, now complaining of more severe abdominal pain.

Plus, he’s still leaking from site…
1: The Squirter

2) Place an ostomy bag over the wound to collect ascitic fluid

The patient drains **5L of fluid over 3 minutes**. His blood pressure begins to drop and he becomes more lethargic.

You give him an albumin bolus, however the patient becomes apneic and codes.
1: The Squirter

3) Start broad-spectrum IV antibiotics and call a surgeon
1: The Squirter

4) *Create a pressure bandage and send the patient for STAT CT imaging*

The patient is sent for CT, which **confirms** the presence of an umbilical hernia.

There is no obvious incarceration evident, though “clinical correlation is advised”.
Flood Syndrome

• Eponym for **spontaneous umbilical hernia rupture**

• **20%** of patients with large-volume ascites will develop an umbilical hernia (**rarely** have complication of rupture)

• Often associated with **significant risk of infection**

• **High mortality - up to 60%!**
Flood Syndrome

• Apply pressure dressing

• Broad-spectrum IV abx

• Surgery consult - may be surgical candidate (elective herniorrhaphy) once medically optimized +/- TIPS prior to surgery if refractory ascites
ADVENTURE 2
The GI Bleeder

CHERISE, 45F
2: The GI Bleeder

**HPI**
- Cherise Kelly, 45F.
- History of ESLD with MELD of 20 secondary to alcohol abuse
- Presents with 2 episodes of large volume hematemesis
- Per chart has had varices in past requiring banding

**Exam**
- T 36.8°C  HR 116  BP 80/50  O2 96% RA
- Middle-aged female, appears older than stated age, pale appearing
- Enlarged liver border with no significant abdominal pain noted, mild ascites
- Awake, oriented to self, location
2: The GI Bleeder

You have the nurse place 2 large bore IV’s and place on cardiac monitor.

You obtain a POC hemocue test which shows a hemoglobin of 8.2 g/dL (baseline 11).
It’s Your Choice……Should we……

1) Empirically transfuse 1 unit O negative blood and call GI

2) Start octreotide, ceftriaxone, and call GI

3) Perform serial H&H, and admit to hospitalist if stable

4) Place a Blakemore tube in order to maintain control of bleeding
<table>
<thead>
<tr>
<th>Should we...</th>
</tr>
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<tr>
<td>Place a Blakemore tube in order to maintain control of the bleeding</td>
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</tbody>
</table>
2: The GI Bleeder

1) Empirically transfuse 1U PRBC and call GI

What are indications for transfusion in cirrhotic with upper GI bleed?
Transfusion Strategies for Acute Upper Gastrointestinal Bleeding

Cândid Villanueva, M.D., Alan Colomo, M.D., Alba Bosch, M.D., Mar Concepción, M.D., Virginia Hernandez-Gea, M.D., Carles Aracil, M.D., Isabel Graupera, M.D., María Poca, M.D., Cristina Alvarez-Urturi, M.D., Jordi Gordillo, M.D., Carlos Guarner-Argente, M.D., Miquel Santaló, M.D., et al.

921 patients with severe upper GI bleeding
Randomized, controlled trial

Restrictive strategy (n=444)
Hgb < 7 g/dL
Goal 7-9 g/dL

Liberal strategy (n=445)
Hgb < 9 g/dL
Goal 9-11 g/dL
921 patients with severe upper GI bleeding
Randomized, controlled trial

Restrictive strategy (n=444)
- Hgb <7 g/dL
- Goal 7-9 g/dL

Liberal strategy (n=445)
- Hgb <9 g/dL
- Goal 9-11 g/dL

Higher portal pressures,
Higher risk of rebleeding,
Higher mortality
Survival at 6 weeks

- **95%** for the **Restrictive strategy**
- **91%** for the **Liberal strategy**

*P = 0.02 by log-rank test*

<table>
<thead>
<tr>
<th>No. at Risk</th>
<th>444</th>
<th>429</th>
<th>412</th>
<th>404</th>
<th>401</th>
<th>399</th>
<th>397</th>
<th>395</th>
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<tr>
<td>Restrictive strategy</td>
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<td></td>
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</tr>
<tr>
<td>Liberal strategy</td>
<td>445</td>
<td>428</td>
<td>407</td>
<td>397</td>
<td>393</td>
<td>386</td>
<td>383</td>
<td>378</td>
<td>375</td>
<td>372</td>
</tr>
</tbody>
</table>
2: The GI Bleeder

Take Home Points:

1) Maintain hemodynamic stability

2) Transfuse at hemoglobin <7 mg/dL
   - unless massive GI bleed

3) Avoid rigorous resuscitation with saline
2) Start octreotide, ceftriaxone and call GI

What is the literature for use of these medications?
<table>
<thead>
<tr>
<th>Medication</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vasopressin</strong></td>
<td>Very potent splanchnic vasoconstrictor</td>
</tr>
<tr>
<td></td>
<td>Side effects: ischemia, arrhythmias, bowel ischemia</td>
</tr>
<tr>
<td></td>
<td>If used, should be given with nitroglycerin, limiting utility</td>
</tr>
<tr>
<td><strong>Terlipressin</strong></td>
<td>Vasopressin analogue</td>
</tr>
<tr>
<td></td>
<td>Decreases mortality</td>
</tr>
<tr>
<td></td>
<td>Not available in U.S.</td>
</tr>
<tr>
<td><strong>Octreotide</strong></td>
<td>Somatostatin analogue</td>
</tr>
<tr>
<td></td>
<td>Causes splanchnic vasoconstriction</td>
</tr>
<tr>
<td></td>
<td>Safe, can be used continuously</td>
</tr>
</tbody>
</table>
Cochrane Review

• 21 randomized trials (2,588 patients)
• **No** reduction in mortality
• **0.7 unit reduction** in amount of blood transfused
• Benefit greater if combined with sclerotherapy/invasive measures?
OCTREOTIDE

NO

BENEFIT
Cochrane Review

• Short term prophylactic antibiotics are indicated for patients with cirrhosis & GI hemorrhage

• Decreases rate of bacterial infections (NNT = 1/4)

• Increase survival (NNT = 1/22)

• Decrease in incidence of early rebleeding
Cochrane Review

- Short term prophylactic antibiotics are indicated for patients with cirrhosis & GI hemorrhage
- Decreases rate of bacterial infections (NNT = 1/4)
- Increase survival (NNT = 1/22)
- Decrease in incidence of early rebleeding
The nurse states your patient is now actively vomiting a large volume of bright red blood.

Repeat hemocue is 6.9.

You are giving blood, and GI is on their way, but the patient is looking significantly worse and at risk of not protecting her airway.

What else would you do?
4) Place a Blakemore tube to control bleeding

Are balloon tamponade devices such as Blakemore tubes safe and effective?
Variceal Treatment Options

Balloon Tamponade

Linton-Nachlas tube

Single big balloon (500ml)

Sengstaken-Blakemore

Minnesota tube

Oesophageal aspiration port
Sengstaken-Blakemore Tube

Developed in 1950
1st line until 1980 (40%)
Down to 6% in 2000
Sengstaken-Blakemore Tube

Blakemore Tube
Clinical question: What is outcome of Blakemore tube as rescue therapy for uncontrolled variceal hemorrhage with hemodynamic instability or failure of endoscopic treatment?

512 patients undergoing endoscopy for variceal bleed

If bleeding was not controlled, Blakemore tube was placed

Blakemore was successful in 75.8% of patients

22% re-bled in 24 hours

6.1% had esophageal perforation

42% died at 30 days
Variceal Treatment Options

**Esophageal Stent**

Small, non-controlled trial showed good bleeding control with self-expanding stent
Stent migration may occur

**TIPS**

Last resort!
Technically challenging
Control of bleeding and decreased mortality if performed within 8 hours
Not available at all centers
ADVENTURE 3
The Liver Bomb

CHUCK
50M
3: The Liver Bomb

HPI

- Chuck Reddy, 50M.
- History of alcoholic liver cirrhosis, current daily drinker
- Poorly doctored
- Chief complaint is generalized weakness, poor urine output

Exam

- Middle aged male lying in gurney, slightly lethargic
- Decreased breath sounds/rales at bases of lungs bilaterally
- Abdomen with significant ascites present, + rebound/guarding
- Oriented to self & location

T 37.1C  HR 90  BP 70/40  O2 95%  RA
Labwork

- WBC 11.1 x 10^9/L
- Hemoglobin 8.0 g/dL
- Hematocrit 24%
- Platelets 50 x 10^9/L
- Na 130 mEq/L
- K 4.3 mEq/L
- CO2 19 mEq/L
- Cl 110 mEq/L
- BUN 35 mg/dL
- Creat 2.0 mg/dL
- Alb 3.5 g/dL
- Tot Protein 5.5 g/dL
- Glucose 89 mg/dL
- AST 200 U/L
- ALT 120 U/L
- Alk Phos 120 U/L
- TBili. 2.0 mg/dL
- PTT 21 sec
- PT 18 sec
- INR 1.5
The nurse notifies you that the patient's blood pressure dropped to 69/40.

At the bedside, you note that the patient is still slightly lethargic but answering questions.

*How do you want to resuscitate this patient?*
It’s your choice……Should we……

1) Empirically transfuse 1U PRBC
2) Give 1L 0.9% saline bolus
3) Obtain blood cultures, start broad-spectrum abx and start pressors
4) Give albumin infusion/bolus
Empirically transfuse 1U PRBC

Give 1L 0.9% saline bolus

Obtain blood cultures, start broad-spectrum abx, and start pressors

Give albumin infusion/bolus
1) *Empirically transfuse 1U PRBC*

You’re kicked out of class!
2) Give 1L 0.9% NS bolus

The patient’s BP hovers around 70 systolic, and the ICU physician is not happy with that amount of NS secondary to the patient’s underlying volume overload status.
Volume Choice?

3) Antibiotics, fluids, and pressors

You start the antibiotics, give 30 ml/kg of fluid and start pressors. Shortly after, the patient begins moaning significantly and his abdomen becomes more tender.

You admit him to the ICU, but you later learn he infarcted his bowel and as he was a poor surgical candidate, passed away.
4) *Give albumin bolus*

The patient’s blood pressure improves to 80/60 and he is slightly more alert.
Volume Choice?

- *Isotonic crystalloids (10-20 ml/kg)* = volume loss due to diarrhea or over-diuresis**

- *Blood* = GI hemorrhage (Hgb <7 g/dL)

- *20-25% Albumin* = SBP, large volume paracentesis, type-1 HRS

- *Pressors* = norepinephrine, vasopressin/consider steroids if persistent shock
AKI in Cirrhosis

• **Definition**: increase $\geq 0.3$ mg/dL within 48hrs, $\geq 1.5$ above baseline, UOP $<0.5$ ml/kg/hr

• Occurs in up to 50% of admitted patients
  - increased risk of mortality

• Serum creatinine tends to **overestimate** renal function
When to Suspect HRS?

• **Hepatorenal syndrome**, subtype of AKI

• Consider if kidney function not improving **despite trial of plasma expansion**

• **Treatment ultimately differs:**
  > vasoconstrictors - ocreotide/midodrine + levophed
  > albumin

• **CRRT:** if otherwise clinically indicated; volume overload, acidosis, hyperkalemia, hyponatremia
ADVENTURE 4
The Para

JESSE
54M
4: The Para

**HPI**

- Jesse Rogers, 45M.
- Former alcoholic with history of cirrhosis, Child Pugh Class B, MELD 12
- Complaining of significant distention from his ascites and requesting paracentesis as he is visiting from out of town
- No I.R. available at your hospital

**Exam**

- Middle aged male who appears to be in pain
- No jaundice or scleral icterus
- Lungs CTAB, no W/R/R
- Very tense, protuberant abdomen with +fluid wave. No rebound/guarding present.

T 37.4°C  HR 80  BP 100/60  O2 98% RA
IT'S YOUR CHOICE......Should we......

1) Draw labwork and await the results prior to performing the procedure

2) Perform the procedure without labwork

3) Tell the patient he is being discharged without intervention

4) Call the patient’s GI physician from out of town to arrange close follow-up
4: The Para

1) Draw labwork and await the results prior to performing the procedure
## 4: The Para

### Labwork

<table>
<thead>
<tr>
<th>Test</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>WBC</td>
<td>$6.7 \times 10^9$/L</td>
</tr>
<tr>
<td>Hgb</td>
<td>8.9 g/dL</td>
</tr>
<tr>
<td>HCT</td>
<td>26.7%</td>
</tr>
<tr>
<td>Plat</td>
<td>$65 \times 10^9$/L</td>
</tr>
<tr>
<td>Na</td>
<td>135 mEq/L</td>
</tr>
<tr>
<td>K</td>
<td>4.0 mEq/L</td>
</tr>
<tr>
<td>CO2.</td>
<td>23 mEq/L</td>
</tr>
<tr>
<td>Cl</td>
<td>100 mEq/L</td>
</tr>
<tr>
<td>BUN</td>
<td>21 mg/dL</td>
</tr>
<tr>
<td>Creat</td>
<td>1.3 mg/dL</td>
</tr>
<tr>
<td>Alb</td>
<td>4.0 g/dL</td>
</tr>
<tr>
<td>Tot Protein</td>
<td>5.8 g/dL</td>
</tr>
<tr>
<td>Gluc</td>
<td>120 mg/dL</td>
</tr>
<tr>
<td>AST</td>
<td>50 U/L</td>
</tr>
<tr>
<td>ALT</td>
<td>30 U/L</td>
</tr>
<tr>
<td>Alk Phos</td>
<td>80 U/L</td>
</tr>
<tr>
<td>TBili</td>
<td>1.8 mg/dL</td>
</tr>
<tr>
<td>PTT</td>
<td>25 sec</td>
</tr>
<tr>
<td>PT</td>
<td>20 sec</td>
</tr>
<tr>
<td>INR</td>
<td>3.0</td>
</tr>
</tbody>
</table>
2) Perform the procedure without labwork

You tell the patient you are going to perform the procedure without doing any labwork.

He asks very nicely, “Is there any way you could please check my labs? I’m worried I might be anemic or my liver is out of wack and I’d feel better having them checked”.
3) Tell the patient he is being discharged without any intervention

The patient and his wife become irate!

Their GI physician calls you from Seattle and confirms the patient’s history; he requests if you would please do the paracentesis as he is not due to go back for at least 5 more days.
4: The Para

4) Call the patient’s GI physician from out of town to arrange close follow-up

You contact the patient’s GI physician, and after a long discussion he kindly ask if you’d perform the paracentesis, as the patient is not due to go home for at least 5 more days.
Hemostasis in Liver Disease

- Thrombocytopenia
- Poor platelet aggregation
- Low blood coagulation factors (i.e. fibrinogen)
- High plasminogen activator

- High vWF
- High Factor VIII
- Low anticoagulants (protein C, S)
- Low plasminogen
Coags & Paracentesis: What’s the Risk?

November 1986

Paracentesis of Ascitic Fluid
A Safe Procedure

Bruce A. Runyon, MD


- Prospective study
- 229 abdominal paracenteses
  - 2 major complications: abdominal wall hematoma requiring transfusion
  - 2 minor complications: abdominal wall hematoma not requiring transfusion
Coags & Paracentesis: What’s the Risk?

- Retrospective study
- 608 abdominal paracenteses
  - Compared pre/post labs (PT, PTT, platelets, Hemoglobin)
  - **NO** increased risk of bleeding if PT/PTT twice normal range or platelet count >50K
Prospective study
1,100 large-volume abdominal paracenteses
- INR between 0.9-8.7
- Platelets between 19 x10^3/μuL to 341
- 612 procedures with platelets <50 x 103 uL
Coags & Paracentesis: What’s the Risk?

- Safe procedure
- <1% risk of bleeding
- Most common problem is leakage
- Should be performed by trained provider
ADVENTURE 5
What’s That Smell?
5: What’s That Smell

HPI

• Rae Jones, 62F.
• History of NASH, MELD 14
• Per daughter, has been increasingly confused over last 48 hours despite compliance with medication
• Family reports 36 hours of left-sided weakness

Exam

T 38.0°C  HR 100  BP 110/60  O2 98% RA

• Cachetic female lying in stretcher
• Abdomen with mild ascites, no rebound/guarding
• + Jaundice and asterixis present
• Oriented to self only. Strength in left upper and lower extremities 3/5 compared to right, 5/5.
5: What’s That Smell?

IT’S YOUR CHOICE……Should we……

1) Admit to medicine service now for hepatic encephalopathy
2) Ask the nurse to administer lactulose
3) Activate stroke due to focal neurologic deficits
4) Obtain CT head without contrast to evaluate for head bleed
Admit to medicine service now for hepatic encephalopathy

Ask the nurse to administer lactulose

Activate stroke due to focal neurologic deficits

Obtain CT head without contrast to evaluate for head bleed
1) Admit to medicine service now for hepatic encephalopathy

The hospitalist states they are admitted some other patients and to call them back when your workup is completed.
<table>
<thead>
<tr>
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<tr>
<td>WBC</td>
<td>11.1 x 10^9/L</td>
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<tr>
<td>Hgb</td>
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<tr>
<td>Plat</td>
<td>120 x 10^9/L</td>
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<tr>
<td>Na</td>
<td>130 mEq/L</td>
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<td>K</td>
<td>3.5 mEq/L</td>
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<tr>
<td>AST</td>
<td>33 U/L</td>
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<tr>
<td>ALT</td>
<td>17 U/L</td>
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<tr>
<td>Alk Phos</td>
<td>144 U/L</td>
</tr>
<tr>
<td>TBili</td>
<td>2.5 mg/dL</td>
</tr>
<tr>
<td>PTT</td>
<td>35 sec</td>
</tr>
<tr>
<td>PT</td>
<td>15 sec</td>
</tr>
<tr>
<td>INR</td>
<td>1.2</td>
</tr>
<tr>
<td>NH3</td>
<td>130 umol/L</td>
</tr>
</tbody>
</table>
How Helpful is Ammonia Level?

Produced by GI tract in response to digested protein

Healthy liver converts to urea or glutamine

Levels in blood are inconsistently elevated; some association between doubled venous ammonia levels and encephalopathy

Affected by fist clenching, use of tourniquet, and whether sample is placed on ice
Other Causes of Elevated Ammonia Levels

- Bacterial overgrowth (may be seen in proton pump inhibitor intake and atrophic gastritis)
  - Citrullinemia
  - Drug toxicity (valproic acid)
  - Extreme exercise
  - Fulminant hepatic failure
  - High-protein meals
  - Inherited disorders of urea cycle
  - Poor assay technique, e.g., prolonged use of a tourniquet, blood specimen not transported on ice
  - Portosystemic shunting
  - Reye’s syndrome
How Helpful is Ammonia Level?

Produced by GI tract in response to digested protein

Healthy liver converts to urea or glutamine

Levels in blood are inconsistently elevated; some association between doubled venous ammonia levels and encephalopathy

Affected by fist clenching, use of tourniquet, and whether sample is placed on ice

**Bottom line:** Should not be used to screen for hepatic encephalopathy if asymptomatic. Should not be used to rule out hepatic encephalopathy if normal value.
## Precipitants of Hepatic Encephalopathy

<table>
<thead>
<tr>
<th>Increased ammonia production, absorption, or entry into brain</th>
</tr>
</thead>
<tbody>
<tr>
<td>GI bleed</td>
</tr>
<tr>
<td>Infection (urinary tract infection, SBP)</td>
</tr>
<tr>
<td>Hypokalemia</td>
</tr>
<tr>
<td>Constipation</td>
</tr>
<tr>
<td>Excess of Dietary Protein</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Medications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzodiazepines</td>
</tr>
<tr>
<td>Alcohol</td>
</tr>
<tr>
<td>Narcotics</td>
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</table>

<table>
<thead>
<tr>
<th>Dehydration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vomiting</td>
</tr>
<tr>
<td>Diuretics</td>
</tr>
<tr>
<td>Large volume paracentesis</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vascular Occlusion</th>
</tr>
</thead>
</table>
2) *Ask the nurse to administer lactulose enema*

The nurse informs you that the patient had a **very large bowel movement** after enema was placed.

UH OH - now the E.R. smells **terrible**!!! The patients in adjacent beds are complaining.  
**Coffee neb to Room 3 STAT!**
5: What’s That Smell?

3) *Activate stroke due to focal neurologic deficits*

The stroke team states patient is outside of window, however recommend *continued medical workup* and will *evaluate patient and order MRI*. 
4) Obtain CT head without contrast to rule out head bleed

“Normal age-related changes, no evidence of intracranial hemorrhage”
Hepatic Encephałopathy

Acute onset of disorientation or asterixis

May be precipitated or non-precipitated

*Focal neurologic deficits may be present in minority of patients*

Use ammonia in clinical context, understanding limitations

Look for secondary cause of elevated ammonia based on ddx
THANK YOU!