Overview

- Liver surgery
- Pancreatic surgery
- Biliary surgery
- Pain management
Liver Anatomy

- Highly vascular
- 1/5 cardiac output
- 80% portal vein
- 20% hepatic artery
- 8 functional segments
- Invisible from surface of liver
- Ability to regenerate
- Can be utilised pre-op by embolisation of blood supply to diseased segments
Liver Resection

- Open (roof top incision) versus laparoscopic
- Very vascular organ, can bleed a lot!
- Variable sized resection depends where and how many lesions
- Review scans and d/w surgeon exact plan
- Laparoscopic and small resections use enhanced recovery protocol
Liver Resection

- 3 phases of surgery; exposure, resection, confirmation of haemostasis and closure
- Surgical techniques vary, usually use CUSA
- Pringle manoeuvre can cause haemodynamic compromise and reperfusion injury (minimised with ischaemic preconditioning)
Anaesthetic assessment

- Patient fitness
- Underlying liver fitness??
- Review scans
Full Open Liver Resection – Anaesthetic Preparation

- Large drip (or 2)
- Rapid transfuser if large resection
- Arterial line
- CVP line
- NG (+NJ if large open resection)
- Active warming
Thoracic epidural and/or wound catheters and PCA (consider intrathecal opioid)
- Urinary catheter
- Vasoconstrictor
- Antibiotic prophylaxis
- Parvolex infusion if large resection, underlying cirrhosis
- CO monitor – LiDCO
Liver Resection – Initial Phase and Resection

- Allow CVP to fall <5mmHg
- Minimal IV fluids
- Avoid PEEP
- Occasionally need diuretic/GTN
- Monitor urine output
- Maintain organ perfusion – vasoconstrictors and/or small fluid boluses
- If large resection monitor blood loss closely
- Consider tranexamic acid
- ABGs assess Hb, Ca and monitor tissue perfusion
- Good communication with surgical team
Haemostatic pause and closure

- Haemostatic pause on completion of resection to allow filling to SVV < 10%
- Introduce PEEP, may need recruitment
- ABG monitor BM, watch for hypoglycaemia and Hb, improving lactate etc.
- Ensure normothermia, corrected hypocalcaemia etc. before wake up
- HDU post op
Large resections
Cirrhotic liver remnant
Critical care
Parvolex intra-op and post-op 100mg/kg in 250ml 5% dextrose
Continue until PT improves
Fluids;
- 70ml/hr 10% dex (watch blood glucose)
- 30ml/hr normal saline
- 10ml/hr 20% albumin (200ml per day)
Liver protocol cont.

- Antibiotics; cefuroxime and metronidazole TDS
- PPI; lansoprazole PO/NG if absorbing, pantoprazole IV if not
- Dalteparin once PT normal and platelets >80, keep flowtrons on ‘til then
- Analgesia; epidural vs. wound catheters and PCA. Beware abnormal clotting and epidural removal. If significant liver dysfunction may struggle to metabolise opiates adequately
- ?? paracetamol
- Enteral feeding
- NG lactulose
Post op liver complications

- High incidence of complications
- Fluid imbalance – ascites
- Liver impairment – peaks 3 days post op
- Hypo/Hyperglycaemia – hypo initially ⇒ hyper means liver improving monitor BMs
- Pyrexia – blood cultures, all lines, CSU, drain fluid, sputum, CXR
- Encephalopathy – exclude sepsis, opioids, hypoglycaemia, give lactulose enema, consider need for ventilation
- Renal impairment
Liver Resection Enhanced Recovery (2)

- Pre op carbohydrate drinks
- Can have IV paracetamol
- OK to drink day of surgery
- Physio that day
- Day 1 can eat + fortisips
- Physio and discharge to ward
- Day 3 apply fentanyl patch and take down epidural if PT and platelets OK, switch to oral analgesia
- Day 4 drain and catheter out, add NSAID if not CI
- Day 5/6 Home, F/U phone call 48 hours later
- F/U OPD at 2–4 weeks
Laparoscopic Liver Resection

- Laparoscopic usually for single tumours or cysts that are fairly peripheral
- Beware risk of venous air embolism especially when CVP low
- Beware concealed and rapid haemorrhage
- Sometimes do hand assisted surgery
Any Questions?
Pancreatic Surgery

- Distal pancreatectomy
- Whipple’s procedure – distal gastrectomy and duodenectomy, cholecystectomy, pancreatectomy, followed by anastomoses of stomach, bile duct and pancreatic remnant to the jejunum
Whipple’s Procedure

Before

After
Pancreatic Surgery Pre–op

- Patient selection? P–POSSUM score?
- Fitness assessment – shuttle test, CPEX
- Informed consent
- Pre–operative assessment
- Medical optimisation
- Nutritional optimisation
Another kitchen sink...
Anaesthetic Management

- Thoracic epidural (or wound catheter and PCA)
- Arterial line and LiDCO
- CVP line
- NG and NJ tubes
- Urinary catheter
- Active warming
Anaesthetic Intra op cont.

- Antibiotics
- Glucose control
- Octreotide (200mcg)
- Protective lung ventilation
- Monitor Hb
- Goal directed fluid therapy – fluid vs. vasopressors
Critical care
Optimise pain control
Goal directed fluid therapy
Early enteral feeding beneficial (3)
Early mobilisation and respiratory physiotherapy (4)
Thromboprophylaxis
Post op antibiotics, 3 doses
Glycaemic control
Pancreatic enzyme replacement
Removal drains, urinary catheter, NGT ASAP (3)
Post op Complications

- High incidence
- Pulmonary insufficiency – atelectasis, infection
- Anastomotic breakdown and leak
- Sepsis – lungs, abdominal, urinary, lines etc.
- Cardiovascular complications – IHD, DVTs etc.
Predicting post op pulmonary complications (5)

- **Patient factors**
  - Smoker, congestive cardiac failure, COPD, low albumin, age >65 yrs, anaemia, low SpO2

- **Surgical factors**
  - Prolonged surgery time >3 hrs, blood transfusion, GA, prolonged hospitalisation

Other HBP surgery

- Distal pancreatectomy
- Laparoscopic/Open cholecystectomy
- Bile duct exploration
- Biliary bypass (hepaticojejunostomy)
- Biliary reconstruction
- Frey’s procedure (combined local resection head of pancreas and longitudinal pancreaticojejunostomy) – for chronic pancreatitis, Rx as for Whipples.
Pancreatic surgery – the future

- Laparoscopic – distal
- Robot assisted laparoscopic
- Pancreatic transplantation
Any Questions?
Post op analgesia

- Thoracic epidural vs. wound catheters and PCAs
  - Surgical concerns re anastomotic leak and vasoconstrictor use
  - Anaesthetic concern re coagulopathy and epidurals, urinary retention
Meta-analysis comparing epidurals and wound catheters in open liver resection found no difference in post op pain relief except on the first day. Both had a similar hospital stay and the wound catheters had a lower complication rate (6).

Single small RCT in liver surgery acknowledged that epidurals provided superior pain relief, although both groups majority of pain scores were mild but epidurals had lengthened hospital stays. No difference in time to mobilisation or complications (7).
Local service review

- Data courtesy of Dr Ian Wrench
- 2 years of data
- Changed to wound catheters half way
- Collected data from ORMIS, metavision, acute pain team
- Compared pain scores, additional analgesic requirements, vasopressor use, days on critical care
Results – number of cases

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<thead>
<tr>
<th>Category</th>
<th>PCEA</th>
<th>WC + PCA</th>
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<tbody>
<tr>
<td>Whipples</td>
<td>11</td>
<td>12</td>
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<tr>
<td>Liver resection</td>
<td>13</td>
<td>10</td>
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<tr>
<td>Misc.</td>
<td>7</td>
<td>6</td>
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### Results cont.

<table>
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<tr>
<th></th>
<th>PCEA</th>
<th>WC + PCA</th>
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<tbody>
<tr>
<td>ASA (Median (range))</td>
<td>2 (2 to 3)</td>
<td>2.5 (2 to 3)</td>
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<tr>
<td>Days on Critical Care (Median (SD))</td>
<td>4 (2.6)</td>
<td>4.2 (2.1)</td>
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<tr>
<td>Days of technique (Median (range))</td>
<td>5 (1 to 7)</td>
<td>4 (3 to 6)</td>
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<tr>
<td>Plain bupivacaine PCEA (%)</td>
<td>13 (42%)</td>
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<td>Noradrenaline use (%)</td>
<td>9 (29%)</td>
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<tr>
<td>Oxycodone PCA (%)</td>
<td>10 (32%)</td>
<td>13 (46%)</td>
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</tbody>
</table>
Results

Highest pain score at rest

- PCEA
  - Moderate or Severe: 60%
  - Nil or Mild: 40%

- WC+PCA
  - Moderate or Severe: 60%
  - Nil or Mild: 40%
Post op analgesia

- Pain scores similar
- No noradrenaline use with wound catheters
Any Questions?
Summary

- Anaesthetic perioperative management for major liver and pancreatic surgery
- Including laparoscopic considerations
- Local experience with post operative analgesic options
Thank you

REFERENCES
(1) Full liver protocol. Via Metavision
(2) Enhanced recovery protocol for liver resection. Via Sharepoint on Anaesthetic intranet