The Role of Regional Anesthesia in ERAS Pathways

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Objectives:

- Goals of ERAS pathways
- Physiologic considerations and stress response/Effects of regional anesthesia
- Epidural analgesia for open and laparoscopic procedures
- Transversus abdominis plane (TAP) block

“The immediate challenge to improving the quality of surgical care is not discovering new knowledge, but rather how to integrate what we already know into practice.”

Urbach DR, Baxter NN. BMJ 2005
Goals of ERAS Pathway

Early Recovery
- Back to baseline (or even improved) function
- Quality of life during recovery process

Barriers to recovery/Discharge
- Pain (need for parenteral analgesia)
- PONV
- Need for IV fluids/resuscitation
- Bed rest/lack of mobility
- Sleep disturbance
- Complications

Physiologic Stress Response

- Insulin resistance
  - Decreased up take of glucose by muscle tissue
  - Loss of muscle mass

- Hyperglycemia
  - Uptake of glucose by immune, endothelial and neural cells
  - Increased glycolysis and oxygen free radical formation
  - Inflammation
  - Increase in infection
  - Endothelial dysfunction and cardiovascular complications
Factors Contributing to Insulin Resistance

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Carli F. Can J Anes 2015
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Carli F. Can J Anes 2015

Surgery/Pain/Inflammation

- Pain from surgical wound
- Nociceptive stimuli lead to:
  - Activation of hypothalamic/pituitary/adrenal axis
  - Release of catecholamines
  - Release of pro-inflammatory cytokines
- Pain without surgery can also lead to an endocrine, metabolic and inflammatory response and insulin resistance

Griesen J., Anesthesiology 2001
Epidural Analgesia and Stress Response

Major abdominal surgery, GA vs. Epidural
Epidural placed PreOp and used during surgery and continued post op.

Outcome:

**Insulin resistance, urinary epinephrine and norepinephrine and plasma cortisol response were higher in the GA group**


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Epidural Analgesia and Stress Response

Laparoscopic colorectal surgery, ERAS protocol
Thoracic epidural vs. wound infusion catheter (WIC)

Outcome:

Attenuating effect of epidural analgesia on stress response expressed by decreased plasma insulin and epinephrine levels

Pain scores were similar, opioid consumption was higher in the WIC group.

Barr J. et al, Tech Coloproctol 2015
Epidural Analgesia and Stress Response

- Epidural decreases insulin resistance/stress response
- Systemic opioids show no attenuation of stress response
- Data lacking on the effects of:
  - NSAIDS, β-blockers, α-2 agonists, IV lidocaine
- Pain scores may be the same with access to IV opioids
- Epidural significantly decreases opioid requirement
Epidural vs Continuous Wound Infusion in Colorectal Surgery

- RCT, Open colorectal surgery
- n = 50, Thoracic epidural vs. CWI (between peritonium and transversalis fascia)

Outcomes:
- Had to stop study early
- Improved pain scores in PACU, POD1, POD2, POD3
- Shorter length of stay (LOS) 4 vs 5.5 days (P = 0.006)

Jouve P. et al, Anesthesiology 2013

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Epidural vs Continuous Wound Infusion in Colorectal Surgery

![Graph showing pain scores over postoperative days](image)

Jouve P. et al, Anesthesiology 2013
Epidural vs Continuous Wound Infusion in Colorectal Surgery

Jouve P. et al, Anesthesiology 2013

Laprosocpic Surgery

Don’t forget the visceral pain
Ischemic cardiac pain
Biliary colic
Ureteral stone
Uterine contractions
Chronic pelvic pain
Bladder spasm
Epidurals and Laparoscopic Colorectal Surgery

- RCT comparing thoracic epidural vs morphine PCA
- n = 20

Outcomes:
- No difference in LOS, start of PO intake, return of bowel function
- Did not report pain scores or opioid consumption


Epidurals and Laparoscopic Colorectal Surgery

- RCT comparing thoracic epidural vs morphine PCA
- n = 38

Outcomes:
- No difference in LOS,
- More pain with PCA group (pain score 1.9 vs 3.3)
- No opioid consumption reported

Senagore AJ. et al, Brit J Surg 2003
Epidurals and Laparoscopic Colorectal Surgery

- RCT comparing thoracic epidural vs morphine PCA
- n = 50

Outcomes:
- No difference in LOS
- Time to start of PO intake, Return of bowel function, Pain scores all favored the epidural group


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Epidurals and Laparoscopic Colorectal Surgery

- Systematic review of literature
- Reviewed 25 articles (excluded some)

Outcomes:
- No difference in LOS
- Thoracic epidural group had overall lower pain scores

Levy BF. et al, Colorectal Disease 2010
Epidurals and Laparoscopic Colorectal Surgery

Conclusion: “There is paucity of data assessing the benefits of postoperative analgesic regimes following laparoscopic colorectal surgery and none of the protocols were shown to be superior.”

Levy BF. et al, Colorectal Disease 2010

Epidurals in Laparoscopic Colorectal Surgery

- RCT, (epidural vs spinal vs PCA)
- n = 99

Outcomes:
- LOS 3.7 days in epidural group vs 2.8 days in PCA group
- Slower return of bowel function in epidural group
- Lower pain scores with epidural group

Levy BF. et al, Br J Surg 2011
**Colorectal Surgery and LOS**

- Retrospective review of 231 patients on an ERAS pathway
- Epidural not used routinely in their protocol
- Multivariate analysis showed:
  - ASA physical status ($P = 0.04$)
  - Avoidance of oral opioids post-operatively ($P = 0.016$)
  - Use of epidural for postop analgesia ($P = 0.023$)

  were all predictors of **shorter** hospital stay


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**Epidurals in Major Gynecologic Surgery**

- Ferguson SE, et al. Gynecol Onc 2009

Outcomes:

- Improved pain scores, faster return of bowel function
- Start epidural pre-incision rather than post-incision
- Use the epidural for postoperative analgesia

Bauchat JR, Habib AS, Anesthesiology Clin 2015
Epidurals in Laparoscopic Gynecologic Surgery

- Case-control study with thoracic epidural vs IV PCA
- n = 60

Outcomes:
- Lower pain scores on PACU admission & discharge/POD1
- Less PONV
- Less shivering
- Less fatigue
- Less analgesic consumption
- Less PACU length of stay

Hospital length of stay was the same


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Epidurals in Laparoscopic Gynecologic Surgery

Postoperative Schmerztherapie nach minimalinvasiver Hysterektomie

Thorakale Periduralanalgesie vs. intravenöse patientenkontrollierte Analgesie

Epidurals in Laparoscopic Gynecologic Surgery

Tab. 2 Aufwachraumdaten und Krankenhausverweildauer

<table>
<thead>
<tr>
<th></th>
<th>i.v.-PCA</th>
<th>PDA</th>
<th>p-Wert</th>
</tr>
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<tbody>
<tr>
<td>PONV-Häufigkeit im AWR (n)</td>
<td>9/30</td>
<td>1/30</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>„Shivering“-Häufigkeit im AWR (n)</td>
<td>8/30</td>
<td>2/30</td>
<td>&lt;0.05</td>
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<tr>
<td>Piritramidgabe im AWR (mg)</td>
<td>7.2±1.4</td>
<td>0</td>
<td>&lt;0.001</td>
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<tr>
<td>Aufenthaltsdauer im AWR (min)</td>
<td>71±32</td>
<td>50±13</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Krankenhausverweildauer (Tage)</td>
<td>4.7±0.6</td>
<td>5.0±0.6</td>
<td>n.s.</td>
</tr>
</tbody>
</table>

Die Ergebnisse werden präsentiert als Mittelwert (± Standardabweichung). AWR Aufwachraum, n.s. nicht signifikant, PONV postoperative nausea and vomiting, „shivering“ Muskelzittern.


TAP Block and ERAS
TAP vs Epidural
Laparoscopic Colorectal Surgery

Only one study comparing continuous TAP vs Epidural

- 2 single shot subcostal injections, 2 posterior TAP injections and two TAP catheters

Outcomes:
TAP was not inferior to epidural
- Pain scores and opioid consumption was similar
- Epidural group had urinary catheter for longer


TAP vs PCA in Laparoscopic Colorectal Surgery

- Case-control study TAP vs control in ERAS setting
- n = 70

Outcomes:
TAP group had lower LOS (2 vs 3 days, P = 0.000013)
TAP group had lower opioid consumption

(31 vs 85 mg morphine equiv. P = 0.01)

TAP vs PCA in Laparoscopic Colorectal Surgery

- Retrospective study TAP vs PCA in ERAS setting
- n = 44

Outcomes:

TAP group had lower LOS (4 vs 5 days, P = 0.02)
TAP group had lower pain scores and opioid consumption


Conclusions

- Epidurals decrease stress response/insulin resistance
- Epidurals in major open surgery:
  Decrease pain, opioid consumption and LOS
- Epidurals in laparoscopic surgery:
  LOS data is mixed (mostly no change)
  Decrease pain scores and opioid consumption
  Visceral pain
- TAP blocks
  Limited data in ERAS patients, No RCTs
  May reduced length of stay
  Decrease pain/opioid consumption