PERSISTENT PAIN AFTER SURGERY – WHO, HOW AND WHY?

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‘What does it matter how I loose it?’

Alexander the great 333BC
The Biopsychosocial model in practice

- Pain behaviour
- Mechanical allodynia
- Cold allodynia
- Expansion of original pain area
Plan for the talk

- What is CPSP?
- What is the definition?
- What is the incidence?
- What are the risks factors?
- What can we do about it?
WHAT IS CPSP?
No pain
CPSP in the medicolegal context – beware!

1. Previously painful condition
2. Acute pain
3. Female
4. Depressed
5. Incidence
6. Examination
7. Operated on 4 times

Blue oval – area of allodynia or pain hypersensitivity
Red line – surgical scar
Green line – cutaneous nerves
DEFINITIONS
Definition of CPSP

- Pain developed after a surgical procedure

- Pain should be of at least 2 months’ duration

- Other causes for pain should be excluded: infection or continuing malignancy in cancer surgery

- Possibility that pain is continuing from a pre-existing problem should be explored and excluded if possible

Macrae WA. Chronic post-surgical pain: 10 years on. BJA 2008; 101: 77–86
Definition of CPSP-update

- Pain developed after a surgical procedure or increases in intensity after a surgical procedure.

- Pain should be of at least 2 months’ duration, 3-6 months’ duration and significantly affect QOL.

- The pain is either a continuation of acute post-surgery pain or develops after an asymptomatic period.

- The pain is either localised to the surgical field, projected to the innervation territory of a nerve situated in the surgical field, or referred to a dermatome (after surgery in deep somatic or visceral tissues).

- Other causes for pain should be excluded: infection or continuing malignancy in cancer surgery.

The importance of definitions and diagnosis

• Treede at al. A classification of chronic pain ICD11
WHAT IS THE INCIDENCE OF CPSP?
Prevalence of persistent postsurgical pain – population study

- Tromsø, Norway
- 12 900 participants
- 2 041 had surgery in past 3 years
- 40.4% described persistent postsurgical pain
- 18.3% moderate to severe pain
- Association between pain and sensory abnormalities (hypo- or hyperaesthesia)
- Correlation confirmed on QST

Chronic postsurgical pain in Europe (1)

- 21 hospitals 11 countries 3120 patients after surgery
- Pain: day 1/ @ 6 months / @ 12 months

- 12 months:
  - Mod to severe pain 11.8% (NRS>3) and severe pain 2.2% (NRS>6)

- Neuropathic pain
  - 35.4% in mod pain and 57.1% with severe pain

Chronic postsurgical pain in Europe (2)

- Functional impairment increased with severity of CPSP and neuropathic characteristics

- Orthopaedic surgery, pre-op chronic pain and % of time in severe pain on day 1 were risk factors

- 10% increase in severe pain assoc with 30% increase of CPSP at 12 months
## Chronic post-surgical pain (CPSP)

<table>
<thead>
<tr>
<th>Type of Operation</th>
<th>Incidence of Chronic Pain</th>
<th>No. of ops in UK in 2005-6</th>
<th>No. of ops in USA in 1994</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mastectomy</td>
<td>20-50%</td>
<td>18,000</td>
<td>131,000</td>
</tr>
<tr>
<td>Caesarean</td>
<td>6%</td>
<td>139,000</td>
<td>858,000</td>
</tr>
<tr>
<td>Amputation</td>
<td>50-80%</td>
<td>15,000</td>
<td>132,000</td>
</tr>
<tr>
<td>Cardiac Surgery</td>
<td>30-55%</td>
<td>29,000</td>
<td>501,000</td>
</tr>
<tr>
<td>Hernia repair</td>
<td>5-33%</td>
<td>75,000</td>
<td>689,000</td>
</tr>
<tr>
<td>Hip Replacement</td>
<td>12%</td>
<td>61,000</td>
<td></td>
</tr>
<tr>
<td>Thoracotomy</td>
<td>5-65%</td>
<td></td>
<td>660,000</td>
</tr>
</tbody>
</table>

Macrae WA. *BJA* 2008; 101(1): 77–86
Is this anything new?

- Pain that persists after a wound has healed is a major problem
- Given size of population rates are alarming high
- But not all. Is there a susceptibility?

(primary data taken from National Centre for Health Statistics)
Diffuse Noxious Inhibitory Control In Chronic Pain

Pain syndromes are due to a loss of DINC
Patients given a painful stimulus and a stimulus to potentiate descending inhibition (King)
Controls show that pain perception decreases when DINC activated
Chronic pain patients demonstrate no such effect
Similar effects noted for tension type headaches (Landau) and IBS

Is this anything new?

- **OXPOP**
  - 7000 deliveries at Women's Centre in Oxford
  - 25% are surgical
  - Longitudinal prospective clinical trial designed to investigate the incidence of pain post surgery
  - Started in 2011
  - 610 patients enrolled
  - Followed up at 2, 4, 6 and 12 months with questionnaire
  - 23% pain at 4 months
  - 9% at 12 months
RISK FACTORS FOR THE DEVELOPMENT OF CPSP
Patient black box

- Age
- Psychology
- Pre-op pain
- Genetics
- Sleep
- Gender
- Early post-op pain
- Pre-operative nerve sensitivity (QST)
Surgical black box

Type of procedure

- Open or laparoscopic
- Nerve preservation
- Nerve section
- Nerve traction

Anaesthetic technique

- Local anaesthetic blockade
- Pain in recovery
- Early post-op pain

Pain in recovery
black box

Genetics

Nerve preservation

Type of procedure

Anaesthetic technique

Local anaesthetic blockade

Pain in recovery

Psychosocial
Catastrophization?

Early post-op pain
Tasmuth et al. Effect of persistent pain on women treated for breast cancer. Pain 96 342-347
Age

- Younger patients seem to have an increased risk of CPSP
  - Women undergoing breast cancer surgery: ↓probability of CPSP of 5% with each year increase in age
  - Similar to a study of hernia patients
  - Possibly due to a reduced peripheral nociceptive function with increased age

- Children and adolescents have a decreased risk of CPSP (?psychology)
Gender

- Women higher incidence of chronic pain
  - Neuropathic
  - Musculoskeletal
  - Abdo pain
  - Migraine

- Acute post-operative pain:
  - higher NRS ratings immediately post-op compared to men
  - Use less opioid via PCA
  - Possibly due to increased adverse effects

Psychology

• Depression
  • Severe CPSP correlated with severe pre-op depression
  • More likely to use antidepressants before surgery
• Psychological vulnerability
  • Factor both pre and post-op
• Anxiety; catastrophizing; optimism / pessimism; locus of control; illness attitudes
• Psychological factors impact on surgery

Acute post-operative pain

• Strong correlation between severity of acute post-op pain and CPSP
  • multiple studies
  • various surgical procedures

Sustained pain

• Median pain scores over 7 days more predictive of CPSP than the max pain score

• Possible reasons:
  • Sustained nociceptive input may produce central sensitisation
  • Or ongoing pre-op pain
  • Or may have severe acute pain because CPSP already developing
Highest risk factors

- Women
- Younger age
- Anxiety
- Depression
- Sleep disturbance

- Severe acute post op pain
- Nerve injury

* see later
CAUSES OF CPSP
Neuropathic Pain

• Patients with neuropathic pain commonly present to primary care professionals, but making a diagnosis may be difficult.
• post-traumatic neuropathic pain (from accidental or surgical injury) is probably the most common cause

R Freynhagen. Diagnosis and management of neuropathic pain
BMJ 2009;339:b3002
Diagnosis of Neuropathic Pain

- **Need three factor for probable**
- **Trauma**
- **Neuroanatomically plausible**
- **Positive signs**

Treede et al, redefinition and a grading system for clinical and research purposes Neurology 2008 vol 70, no 18, 1630-1635
Nerve sensitivity

- **Quantitative sensory testing (QST)**
  - Assesses skin Aβ, Aδ and C fibre function with temperature, touch and vibration thresholds
  - Functional abnormalities have been found post-hernia repair
  - May predict severe acute post-op pain

- **Descending noxious inhibitory control (DNIC)**
  - Tests the effectiveness of the endogenous analgesia
  - Conditioning stimulus of hand in hot water
  - May be a better predictor of CPSP

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Treede et al, redefinition and a grading system for clinical and research purposes Neurology 2008 vol 70, no 18, 1630-1635
Confirming the diagnosis

- Pain detect or others
- Quick, easy
- Does not require examination
- Developed for back pain
- Sensitive and specific

https://www.pain-detect.de
Other examination findings
Further examination findings
Immunomodulation

- CPSP following thoracotomy:
  - 40% after lung cancer
  - 5% after lung transplantation

- Suggested role of perioperative inflammatory and immune responses in nerve damage

- Effects reduced during immunosuppression

Immunomodulation in pregnancy

• Pregnancy presents an immune modulated state:
  • Immune suppressed enough to tolerate the genetically distinct feto-placental unit
  • Robust enough to counter infectious diseases

• Complex and changing interaction between:
  • T helper cells
    • Th 1 pro-inflammatory
    • Th 2 anti-inflammatory
  • T regulatory cells

• In CPSP “systemic, enhanced proinflammatory status has to be regarded as an important determinant of vulnerability”

RISK REDUCTION STRATEGIES
<table>
<thead>
<tr>
<th>Drug</th>
<th>Early effects</th>
<th>Late effects</th>
<th>Side effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intrathecal clonidine</td>
<td>Decreased wound hyperalgesia at 48h</td>
<td>No reduction in chronic pain</td>
<td></td>
</tr>
<tr>
<td>Wound infusions-LA +/- NSAIDs</td>
<td>Opioid sparing and decreased pain in first 24h</td>
<td>No long-term benefit</td>
<td></td>
</tr>
<tr>
<td>TAP blocks</td>
<td>No benefit in spinal anaesthesia</td>
<td>No long-term benefit</td>
<td></td>
</tr>
<tr>
<td>Magnesium</td>
<td>No short-term benefit</td>
<td></td>
<td>Increased intra-op blood loss</td>
</tr>
<tr>
<td>Ketamine</td>
<td>No short-term benefit</td>
<td></td>
<td>Restless, drowsy, light-headed, dizzy</td>
</tr>
<tr>
<td>Gabapentin / pregabalin</td>
<td>Improved pain scores and patient satisfaction</td>
<td>Underpowered to identify benefit</td>
<td>Sedation problematic</td>
</tr>
</tbody>
</table>
Cochrane review of pharmacotherapy to prevent CPSP

- Available evidence does not support the efficacy of
  - gabapentin
  - pregabalin
  - non-steroidal anti-inflammatories
  - intravenous steroids
  - oral NMDA blockers
  - oral mexiletine
  - intravenous fentanyl
  - intravenous lidocaine
  - oral venlafaxine or
  - inhaled nitrous oxide

for the prevention of chronic postoperative pain.

Identifying those at risk of developing CPSP

- Pre-existing chronic pain conditions
  - Migraine / IBS / Fibromyalgia / Back pain
- Anxiety
- Depression
- Fear of pain
Pre-op anxiety

- Anxiety and fear of surgery
- APAIS (Amsterdam Preoperative Anxiety and Information Scale) questionnaire
  - Anxiety
  - Need for information – low/intermediate/high
- Providing information to patients before surgery reduces anxiety
  - Written / videos

1. I am worried about the anaesthetic.
2. The anaesthetic is on my mind continually.
3. I would like to know as much as possible about the anaesthetic.
4. I am worried about the procedure.
5. The procedure is on my mind continually.
6. I would like to know as much as possible about the procedure.

Psychology

- Pain anxiety as a target for CBT
  - Useful in HIV patients
- Catastrophizing
  - A strong predictor of CPSP
  - Amenable to treatment

Barriers to effective pain management at home

• 30-60% of patients:
  • moderate to severe pain in first 24 hours after discharge home following day surgery

• 25-30% continue to report pain at 7 days

• Insufficient prescribed drugs

• Prescribed but not taken:
  • Unclear (or no) instructions
  • Fear of addiction
  • Side effects (nausea, vomiting, constipation)

Conclusion

- Good quality post-op analgesia for all
  - Extend analgesia into first 7 days

- Extra interventions more likely to be of benefit if targeted at vulnerable patients
  - Anxiety, pre-op chronic pain

- Psychological and pharmacological interventions may be of use in high-risk patients but insufficient data as yet