Chronic postsurgical pain: An inevitable consequence of surgery or preventable disease?

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The concept of chronic postsurgical pain (CPSP) as a discrete condition has its origins in the early 1990s. At this time a survey of pain services in the North of England and Scotland identified that 20% of attendees to pain clinic attributed the onset of their pain, at least in part, to surgery[1]. Almost 30 years later CPSP was included in the International Classification of Diseases, Eleventh Revision (ICD-11) as a disease in its own right[2]. The ICD-11 definition of CPSP states:

"Chronic postsurgical or post traumatic pain is pain developing or increasing in intensity after a surgical procedure or a tissue injury (involving any trauma including burns) and persisting beyond the healing process, i.e. at least 3 months after surgery or tissue trauma. The pain is either localized to the surgical field or area of injury, projected to the innervation territory of a nerve situated in this area, or referred to a dermatome (after surgery/injury to deep somatic or visceral tissues). Other causes of pain including infection, malignancy etc. need to be excluded as well as pain continuing from a pre-existing pain problem".

One year after surgery the incidence of moderate to severe CPSP is 12% whilst the incidence of severe CPSP is 2%[3]. A significant proportion of this pain, 35-57%, is neuropathic pain. The incidence is comparatively high for certain orthopaedic operations, as shown in Table 1.

CPSP is an example of the transition from acute to chronic pain. Established CPSP is challenging to treat and efforts to reduce the burden of this disease focus on prevention. Current models of care aim to identify patients at risk of CPSP early in the surgical pathway, to optimise patients prior to surgery, to devise individualised peri-operative analgesic plans, and to manage pain in the acute post-operative period and beyond discharge.

This approach was pioneered in Toronto, Canada, where it was termed a 'transitional pain service' and similar models are increasingly being incorporated into peri-operative guidelines[4]. Recent examples include the Faculty of Pain Medicine 'Surgery and Opioids' document and guidance from GIRFT on ambulatory joint replacement surgery[5,6].

Type of Surgery	Any CPSP (%)	Severe CPSP (%)	Neuropathic Pain (proportion)
Amputation	30-85%	5-10%	80%
Hip Arthroplasty	27%	6%	1-2%
Knee Arthroplasty	13-44%	15%	6%

Table 1: Incidence of CPSP in common orthopaedic procedures.
Source: Acute Pain Management: Scientific Evidence 5th Edition.

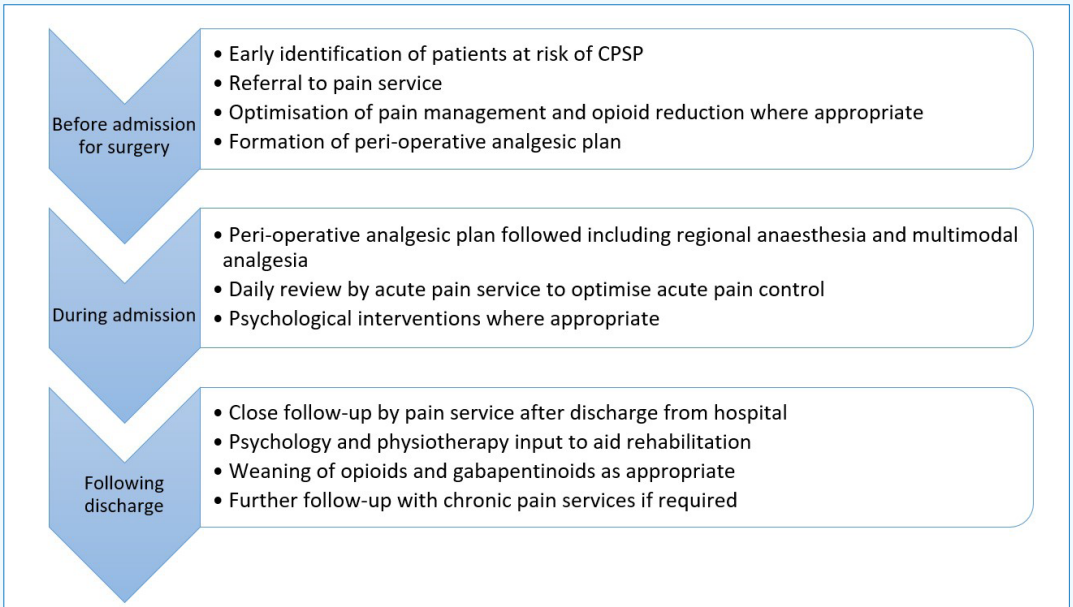

Figure 1: An example of the structure of a transitional pain service.

An example of the transitional pain service model can be seen in Figure 1 and the remainder of this article examines the techniques used to prevent CPSP in more detail.

Pre-operative Strategies

Early identification of patients at risk of CPSP

Risk factors for CPSP are often categorised as pre-operative, intra-operative and post-operative and are summarised in Table 2[7]. These risk factors are not independent of each other. For example, there is a clear link between anxiety, depression and chronic pre-operative pain.

Pre-operative	• Moderate to severe pain, lasting > 1month • Repeat surgery • Psychological vulnerability • Anxiety • Female sex • Younger age (adults) • Worker's compensation • Genetic Predisposition • Opioid use (particularly if ineffective)
Intra-operative	• Surgical approach with risk of nerve damage
Post-operative	• Pain • Radiation therapy • Neurotoxic Chemotherapy • Depression • Psychological Vulnerability • Anxiety • Pain and anxiety trajectories

Table 2: Risk factors for the development of CPSP.
Source: Acute Pain Management: Scientific Evidence 5th Edition.

A risk prediction model has recently been developed and validated for chronic post-surgical pain in adults across a wide range of surgical specialities[8]. The model demonstrates that four easily obtainable predictors are necessary for reliable prediction of CPSP. These are: pre-operative treatment with opioids, bone surgery, numerical rating scale pain score on post-operative day 14, and the presence of painful cold within the area of surgery on post-operative day 14. Painful cold being a sign of post-operative neuropathic pain.

This risk prediction model is consistent with criteria used in current clinical practice. Referral criteria for the original transitional pain service in Toronto were pre-operative pain, with or without opioid use, and severe acute post-operative pain. Where referral to pain clinic prior to surgery is suggested in peri-operative guidelines, it is often recommended that patients with a history of chronic pain or those taking high dose opioids are referred.

Pre-operative opioid reduction

Pre-operative opioid use is associated with a four-fold increase in the odds of CPSP and a reduction in pre-operative opioid consumption by 50% is associated with improved outcomes, measured by WOMAC score at six months to 12 months follow-up, in patients undergoing hip and knee arthroplasty[8,9]. Patients who successfully weaned opioids had similar outcomes to those who did not use opioids pre-operatively. This may prove one of the most effective strategies in the prevention of CPSP although the process of opioid reduction, even in a motivated patient, can take many months.

Pre-operative psychological interventions

The identification of psychological risk factors for the development of CPSP has led to interest in the use of peri-operative psychological interventions. A systematic review of cognitive behavioural therapy, relaxation therapy, or a combination of the two, demonstrated a reduction in the severity of CPSP at follow-up ranging from three to 30 months[10]. The treatment effect was comparable to some commonly used pharmacological interventions.

Intra-operative strategies

Pharmacotherapy

Gabapentinoids, ketamine, glucocorticoids, non-steroidal anti-inflammatory drugs (NSAIDS) and intravenous lidocaine all have the potential to reduce both acute post-operative pain and CPSP. Results from three meta-analyses over the last decade have been conflicting and further large randomised controlled trials are needed[11-13]. There are ongoing trials into peri-operative gabapentinoids (GAP study) and ketamine (rocKET trial). >>

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Gabapentinoids have been widely used in enhanced recovery programmes for both their effect on acute pain and CPSP, however, they are associated with a 50-80% increase in the odds of respiratory complications when used in the peri-operative period for hip and knee arthroplasty[14]. It would seem prudent to use these agents only in those most likely to benefit until further research has been completed.

Regional anaesthesia and local anaesthetic infiltration

Peri-operative regional anaesthesia has been shown to reduce CPSP in many different types of surgery. A Cochrane review demonstrated a treatment effect for local anaesthetic infusion in iliac crest bone-harvesting[15]. There is limited evidence from meta-analyses for other orthopaedic procedures due to the heterogeneity of studies. It is, however, undeniable that regional and local anaesthesia have a profound effect on acute post-operative pain and in most areas where data is available regional anaesthesia does have a treatment effect for the prevention of CPSP. The use of regional anaesthesia in patients at risk of persistent post-operative pain is a widely accepted technique.

Post-operative strategies

Acute post-operative pain management

Acute post-operative pain is an established risk factor for CPSP and acute pain teams play an important role in treating this. Current consensus on post-operative pain management accepts that focussing solely on pain intensity creates unrealistic expectations and drives opioid prescribing. Post-operative prescribing should enable early functional recovery whilst weaning medications as appropriate to prevent long term harms.

Abnormal pain trajectories, such as increasing or unresolving pain, may indicate neuropathic pain, complications of surgery or psychological distress, all of which increase the risk of CPSP. Acute pain teams are uniquely placed to identify abnormal pain trajectories early.

Psychological factors including anxiety, depression, poor coping skills and catastrophising are significant risk factors for CPSP and psychological intervention in the peri-operative period has been shown to reduce the incidence of CPSP[9]. The inclusion of psychologists in acute pain teams is a relatively new concept and at present few hospitals have this in place in the UK.

Pain management in the outpatient setting

The transitional pain service model aims to provide outpatient follow-up for the months following discharge from hospital. They provide ongoing psychological support, assistance with rehabilitation and medication management.

One such service, the Acute Pain Service Outpatient Clinic (APS-OPC), in Helsinki, Finland has shown promising outcomes. Patients received psychological interventions and physiotherapy for an average of 2.8 months. At discharge from hospital 54% of patients were taking weak opioids, 32% strong opioids and 71% gabapentinoids. At discharge from the APS-OPC 20% of patients were taking weak opioids, 6% strong opioids and 43% gabapentinoids[16].

Conclusion

The transitional pain service model has the potential to improve outcomes for patients who require orthopaedic surgery and are at risk of CPSP. There is a growing body of evidence for certain components of the transitional pain service and some, such as pre-operative optimisation of pain and opioid prescribing, are already included in orthopaedic peri-operative guidelines. Evidence for the transitional pain service as a whole is still limited and the extent to which these services can reduce the incidence of CPSP is yet to be seen. ■

References

References can be found online at www.boa.ac.uk/publications/JTO.