PPSP and joint replacements

Sanchit Mehendale
Consultant Orthopaedic Surgeon
Bristol Royal Infirmary and AOC
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Overview

- Background
- The problem
- Investigations
- Risk factors
- Acute post-operative pain
- Treatment strategy
- Enhanced recovery pathways

PPSP

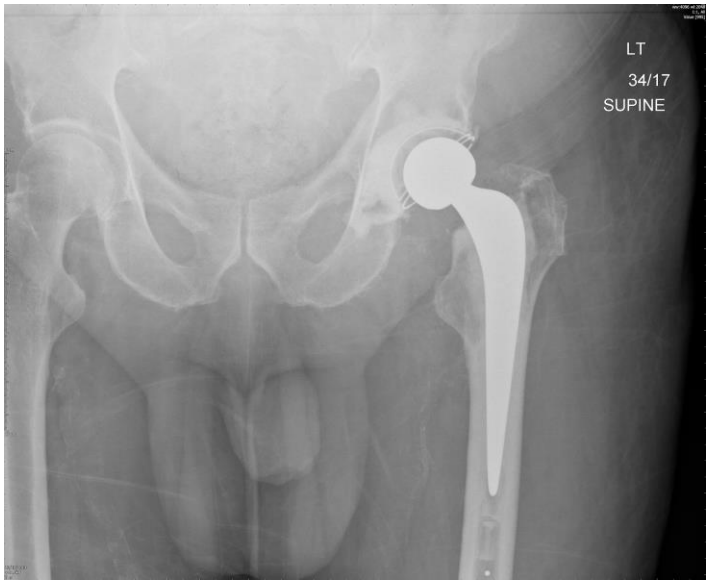
- Pain after surgical procedure
- At least 3 months duration
- Other causes of pain excluded
- Possibility of pain continuing from a pre-existing problem should be excluded

Background

- Surgeon satisfaction Versus Patient satisfaction.
- Clinico-radiological outcome versus patient satisfaction
- PROMs – increasingly accepted as measure of success

The problem

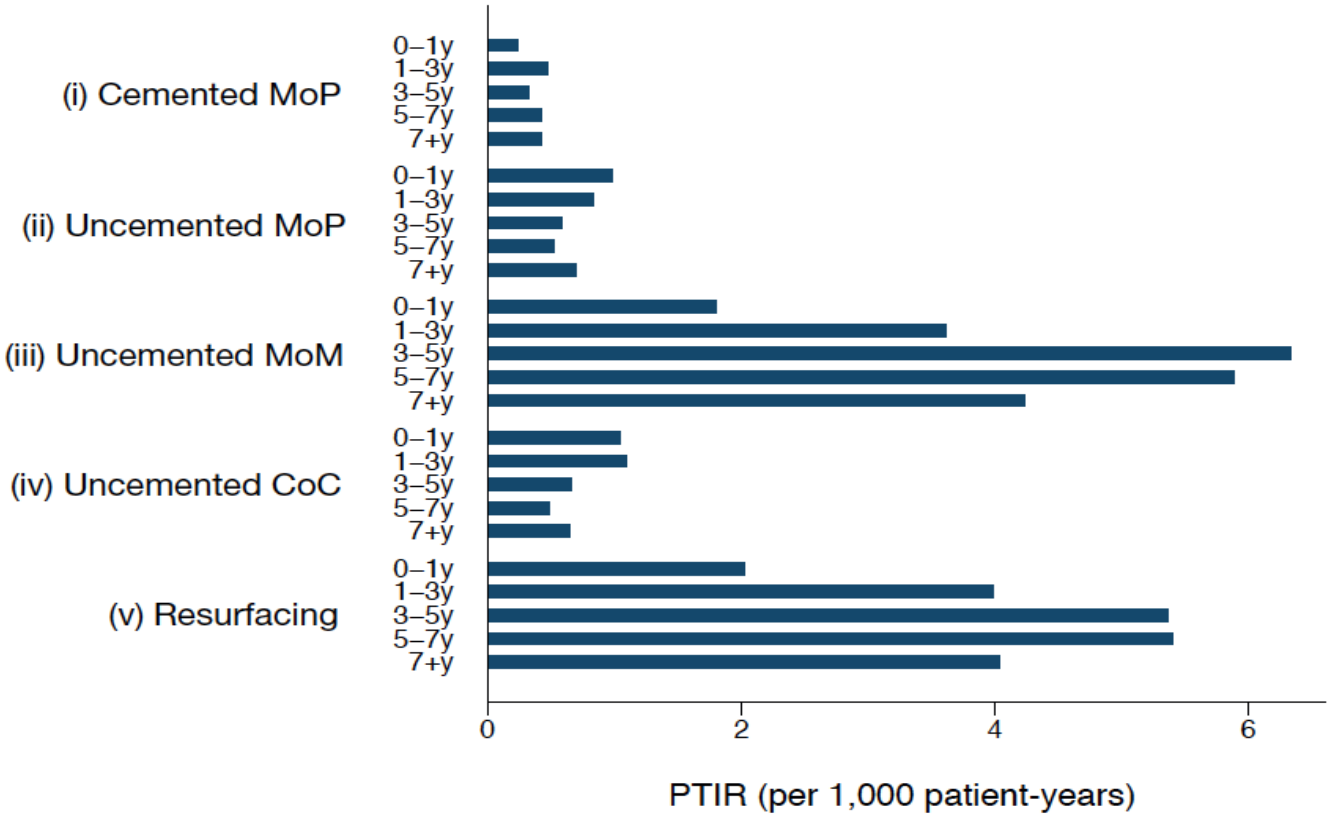
- 2003-2015- 796,000 THR
- 2015 - 93,886 THR
- 4078 (2900)- “Pain” cause for revision
- Incidence 9-13%
- Range 4.8- 23%



NJR annual report

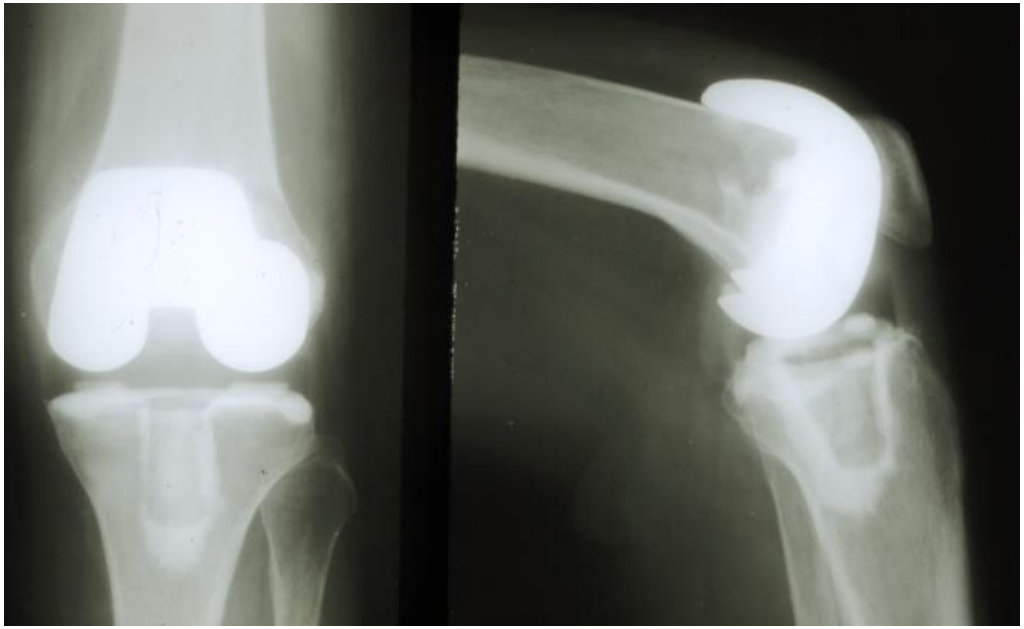
Figure 3.11 (b)

Change in PTIR with time from primary hip replacement, for **pain** for selected fixation/bearing sub-groups.



Total knee replacement

- 2003-2015- 871,472 TKR
- 2015- 94,023 TKR
- “Pain”- second highest PTIR for revision
- Incidence 10-20%
- Range 10-34%



Shoulder replacements

- Prevalence 22%
- Neuropathic pain 13%
- Fracture > Arthritis
- Severe post-operative pain
- Hemiarthroplasty

•Bjørnholdt, Karen T et al. "Persistent Pain Is Common 1-2 Years after Shoulder Replacement: A Nationwide Registry-Based Questionnaire Study of 538 Patients." *Acta Orthopaedica 86.1 (2015): 71-77. PMC. Web. 30 Apr. 2017.*

Causes of pain

- Infection
- Referred pain
- Malalignment
- Instability
- Stiffness
- Impingement
- Loosening
- Nerve damage

Investigations

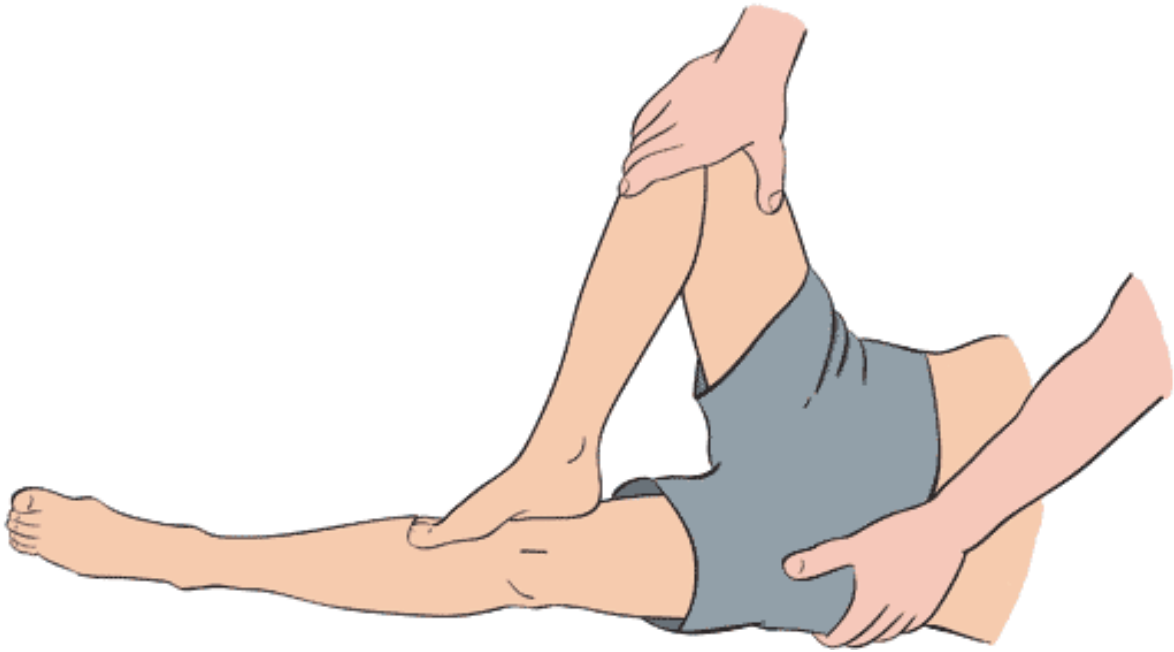
- History
- Clinical evaluation
- Serological investigations
- Diagnostic imaging
- Microbiological analysis

Evaluation

- History
  - Pain free period
  - Pre-op symptoms
  - Correlation with radiological changes
  - Medical co-morbidities
  - Complications

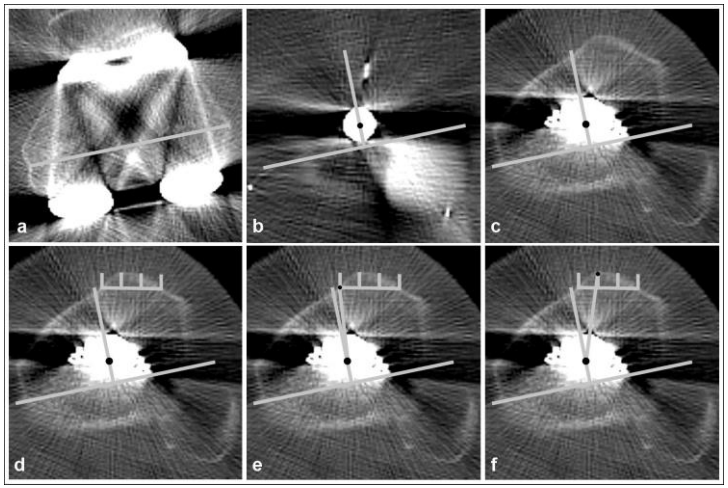
Evaluation

- Examination
  - Tenderness
  - Swelling
  - Instability
  - Impingement
  - Malalignment
  - Stiffness

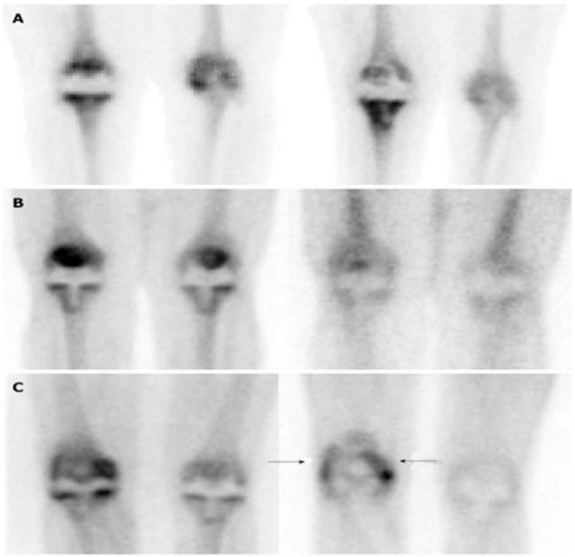


Evaluation

- Serology
  - Full blood count
  - CRP

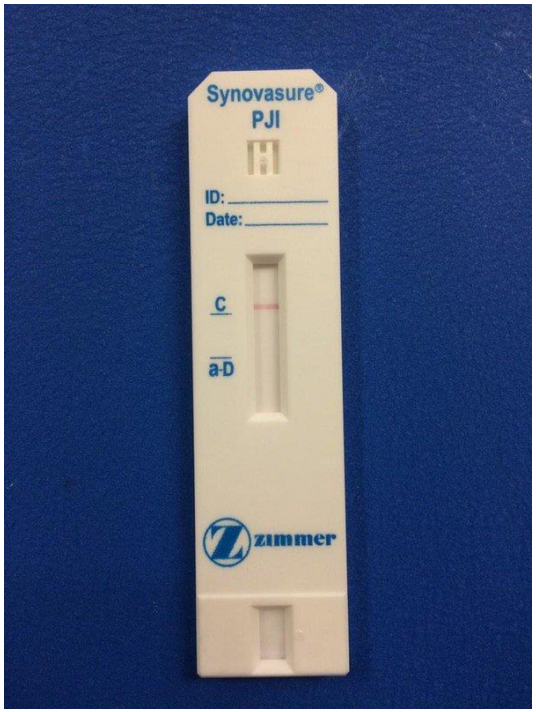


- Diagnostic evaluation
  - Plain radiograph/ long leg alignment
  - CT scan/ MRI scan
  - Bone scan



Evaluation

- Microbiology
  - Aspiration
  - Microscopy and culture
  - Synovasure
  - Biopsy



Factors

- Identification of “patients at risk” pre-operatively
- Pre and post surgical factors
- Targeted additional pain management and rehabilitation

Factors

- Better general health
- Better physical, emotional and social function
- Motivation
- Self-efficacy
- Lower levels of pain before surgery and during rehabilitation

•Beswick, Andrew David, et al. "What proportion of patients report long-term pain after total hip or knee replacement for osteoarthritis? A systematic review of prospective studies in unselected patients." *BMJ open 2.1 (2012): e000435*

Knee replacements

Red flags

- Proximal tibial tenderness
- Mid-flexion coronal instability
- Negative social support
- Reduced range of movement
- Depression
  - High BMI, local hypersensitivity, patello-femoral problems

•Persistent pain after knee replacement: do factors associated with pain vary with degree of patient dissatisfaction?Osteoarthritis Cartilage. 2016 Dec;24(12):2061-2068. doi: 10.1016/j.joca.2016.07.012. Epub 2016 Aug 9.

Preop

- Medical co-morbidities
- Predictor of functional status at 1 year

- Greenfield, Sheldon, et al. "The importance of co-existent disease in the occurrence of postoperative complications and one-year recovery in patients undergoing total hip replacement: comorbidity and outcomes after hip replacement." *Medical care 31.2 (1993): 141-154.*

Factors

- Pain
  - Reduced pressure pain thresholds
  - Facilitated temporal summation of pain
  - Decreased conditioned pain modulation

- Petersen, Kristian Kjær, et al. "Presurgical assessment of temporal summation of pain predicts the development of chronic postoperative pain 12 months after total knee replacement." *Pain 156.1 (2015): 55-61.*

Factors

- Female sex
- Younger age
- Previous surgery
- Knee versus hip replacement
- Pain elsewhere in the body
- Lower quality post-surgical pain control

- Liu, Spencer S., et al. "A cross-sectional survey on prevalence and risk factors for persistent postsurgical pain 1 year after total hip and knee replacement." *Regional anesthesia and pain medicine 37.4 (2012): 415-422.*

Pain modulation

- Joint pain at rest versus joint pain on movement
- Central versus peripheral sensitization
- Higher association of PPSP at 18 months
  - Higher levels of Pain at rest
  - Lower pain thresholds
- Biopsychosocial approach

- Lundblad, H., A. Kreicbergs, and K-Å. Jansson. "Prediction of persistent pain after total knee replacement for osteoarthritis." *Bone & Joint Journal 90.2 (2008): 166-171.*

Factors

- Preop pain severity
  - Primary predictor
  - Irrespective of severity of disease or post-op complications
  - Reduced function scores
  - Reduced range of movement
  - Longer inpatient stay/ rehabilitation

•Brander, Victoria A., et al. "Ranawat Award Paper: Predicting Total Knee Replacement Pain: A Prospective, Observational Study." *Clinical orthopaedics and related research 416 (2003): 27-36.*

Factors

- Preop pain severity
  - More manipulations
  - Increased incidence of complex regional pain syndrome
  - Increased home physical therapy visits
- Pyschosocial
  - Preop
    - Anxiety
    - Depression

•Brander, Victoria A., et al. "Ranawat Award Paper: Predicting Total Knee Replacement Pain: A Prospective, Observational Study." *Clinical orthopaedics and related research 416 (2003): 27-36.*

Predictive risk factors

- Prospective observational study
- PPSP at 6 months
- Risk factors
  - High school diploma
  - Impact of pain on walking ability
  - Absence of regular physical activity
  - APOP (acute postoperative pain) trajectory

- Lloret-Linares, Célia. "Predictive factors of chronic post-surgical pain at 6 months following knee replacement: Influence of postoperative pain trajectory and genetics." *Pain physician 19 (2016): E729-E741.*

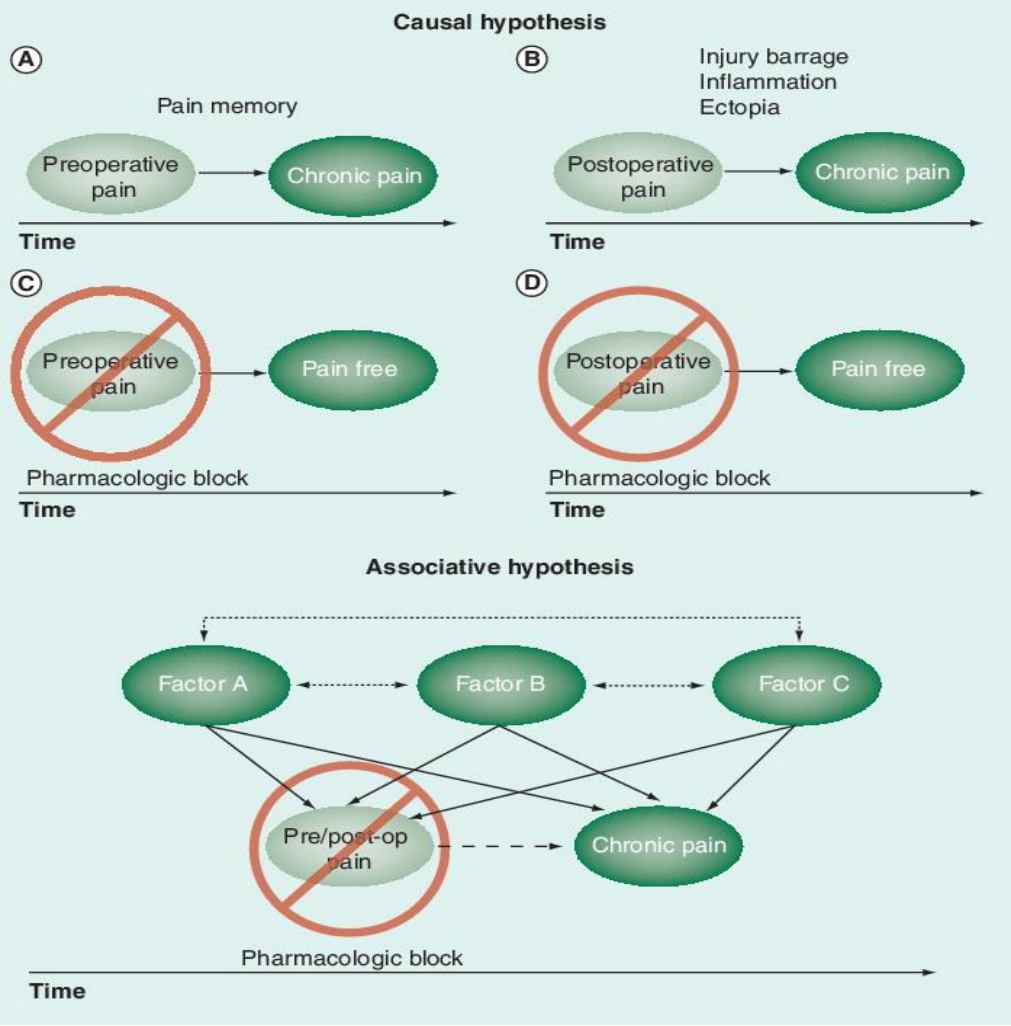
Acute pain to PPSP

Table 1 Progression from acute pain to chronic postsurgical pain after various surgical procedures

	Severe acute pain (at 24 h)	Subacute pain (from day10 to 6–8 weeks)	Chronic pain (from 3 to 12 months)	Neuropathic component of CPSP
Limb amputation [6,7]	[30%]	50–75%	50–85%	>80%
Thoracotomy [8,9]	[30%]	39–50%	16–21%	>46%
Breast cancer surgery [10]	[30%]	16%	47%	65%
Major abdominal surgery [11,12•]	[30%]	18%	7–14%	?
Craniotomy [13]	20%	6%	7–29%	25%
Inguinal hernia [14,15]	7%	14%	12%	80%
Knee arthroplasty [16]	44%	16–52%	13%	?
Hip arthroplasty [16]	40%	20%	12%	?
Cesarean delivery [17,18]	17%	9–16%	4–10%	53%
Cosmetic breast surgery [19,20]	[30%]	25–32%	6–14%	38%
Cosmetic chest surgery [21]	[30%]	25%	14%	?

Lavand'homme, Patricia. "The progression from acute to chronic pain." *Current Opinion in Anesthesiology 24.5 (2011): 545–550.*

Acute pain to PPSP



- Katz, Joel, and Ze'ev Seltzer. "Transition from acute to chronic postsurgical pain: risk factors and protective factors." *Expert review of neurotherapeutics 9.5 (2009): 723-744.*

Acute pain to PPSP

- Relationship poorly understood
- THR surgery
- 82 patients
- Immediate post-op pain
- 6 months follow up
- No correlation

- Clarke, Hance, et al. "Acute pain after total hip arthroplasty does not predict the development of chronic postsurgical pain 6 months later." *Journal of anesthesia 24.4 (2010): 537-543.*

Acute Post-operative pain

- Intrathecal morphine
- 3 groups
- Reduction in requirement of intravenous opioids for the first 3 days
- No change in PPSP at 6 months

- Foadi, Nilufar, et al. "The improved quality of postoperative analgesia after intrathecal morphine does not result in improved recovery and quality of life in the first 6 months after orthopedic surgery: a randomized controlled pilot study." *Journal of pain research 10 (2017): 1059.*

Treatment strategy

Preop

- Patient education
- Accurate diagnosis
- Better pre-op pain control

Treatment strategy

Peri-operative

- Multimodal analgesia
  - NSAIDs
  - Ketamine
  - Local anaesthesia
    - Local infiltration
    - Peripheral nerve block
    - Regional anaesthesia
- Opioids

Treatment strategy

Peri-operative

- Gabapentin
- Pregabalin

- Clarke, Hance, et al. "The prevention of chronic postsurgical pain using gabapentin and pregabalin: a combined systematic review and meta-analysis." *Anesthesia & Analgesia 115.2 (2012): 428-442.*

Treatment

- TKR patients
- Prospective randomized controlled trial
- Pregabalin before and 2 weeks after surgery
- Reduced chronic neuropathic pain
- Reduction in opioid requirement
- Better ROM
  - Early post-op sedation and confusion

- Buvanendran, Asokumar, et al. "Perioperative oral pregabalin reduces chronic pain after total knee arthroplasty: a prospective, randomized, controlled trial." *Anesthesia & Analgesia 110.1 (2010): 199-207.*

Enhanced recovery pathways

- Preop
  - Patient education/expectations
  - Psychological and organizational preparation
  - Nutritional and medical optimization
  - Dissatisfaction = Pain

Enhanced recovery pathways

- Peri-operative
  - Pre-emptive analgesia
  - Local infiltration analgesia
  - Neuromuscular electric stimulation
  - Dedicated rehabilitation programme
  - Fast track arthroplasty units

•Ibrahim, Mazin S., et al. "Peri-operative interventions producing better functional outcomes and enhanced recovery following total h and knee arthroplasty: an evidence-based review." *BMC medicine 11.1 (2013): 37.*

Transitional Pain team

- Toronto General Hospital
- Dedicated Multidisciplinary team
- Deal with the acute and sub-acute stages of pain to prevent transformation into PPSP
- Tackle at three stages
  - Preop
  - Post-op in the hospital setting
  - Post-op in the outpatient setting

- Katz, Joel, et al. "The Toronto General Hospital Transitional Pain Service: development and implementation of a multidisciplinary program to prevent chronic postsurgical pain." *Journal of pain research 8 (2015): 695.*

Bristol trials

Musculoskeletal Research Unit

- RESTORE programme
- STAR trial
- NIHR funded trials

Conclusion

- 10-20 % of joint replacements will have PPSP
- Patient and clinician education and awareness important
- Peri-operative strategies key in influencing incidence
- Role of peri-operative pain management

Acknowledgements

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Thank you!!