Predicting post-operative pain: Still a long way to go!

There have been tremendous advances in understanding the physiology, signaling pathways and biochemical transmission of pain in the last two decades. This has resulted in novel medications for alleviating pain (COX-2 inhibitors etc.) and alternate drug delivery routes (neuraxial, intra-articular, transdermal). However, post-operative pain continues to be under-treated.\textsuperscript{[1-4]} One of the important reasons for this is individual variation in pain perception and tolerance. Post-operative pain could be better managed if the anesthesiologists or pain physicians could predict the “quantum” of pain not only for different types of surgeries but also for individual patients. One of the areas of interest and research for all physicians dealing with pain relief is the prediction of intensity of post-operative pain. If possible, individualized post-operative pain management strategies could be “tailor made” for patients with low thresholds for pain. Not only this would make the patient more comfortable but would decrease the incidence of all disorders associated with over or under treating pain.

The challenge in segregating patients who will experience more post-operative pain or who would require larger doses of analgesics is that the risk factors for perioperative pain include not only quantitative sensory measures but also psychosocial, gender related and genetic factors.\textsuperscript{[5-10]}

A recent review has concluded that there are four important factors that can have prediction value regarding intensity of pain in the post-operative period. These are - anxiety, pre-existing pain, age, and type of surgery. Factors predicting the quantity of analgesics required are - type of surgery, age, and psychological distress.\textsuperscript{[11]} Awareness about these factors and their early identification can result in optimal pain management. However, individual variations still exist among patients in each of the above mentioned categories.

In an effort to find such patients that would require special, intensive treatment of their post-operative pain, experimentally induced pain has been used to predict post-operative pain intensity. Werner et al. in a review on pain prediction inferred that though pain perception was a complex issue, pre-operative quantitative sensory testing may be a “clinically relevant predictor of post-operative pain.” The authors also reported that pre-operative sensory tests could predict up to 54% of the variance in acute post-operative pain across individual patients.\textsuperscript{[12]} The experimentally induced pain in patients is usually produced by three ways: Extremes of temperature, high pressure or by mechanical injury.\textsuperscript{[13-15]}

The most studied and validated of the above techniques is the use of increasing temperature to produce pain. Pedersen et al. showed a correlation between the pre-operative electrical pain thresholds and post-operative opioid consumption after percutaneous nephrolithotomy. They hypothesized that measurement of electrical pain thresholds in the pre-operative period could be used as a screening tool to identify patients at high risk of post-operative pain after percutaneous nephrolithotomy.\textsuperscript{[16]} Similarly, Rago et al. used a sphygmomanometer cuff to produce a pressure of 250 mm Hg for assessment of pain tolerance and correlated this with pain scores and analgesic requirements after thyroidectomy.\textsuperscript{[17]} Pain induced by electrical stimulation was used by Nielsen et al. for similar prediction regarding post-cesarean pain.\textsuperscript{[18]} However, all the above modalities would need extra-equipment and trained manpower to conduct the prediction tests.

In this issue “Pre-operative pain sensitivity – a prediction of post-operative outcomes”, the authors\textsuperscript{[19]} have tried to correlate pressure and electrically induced pain a day before surgery with the pain scores and morphine requirements (administered through intravenous patent controlled analgesia) in 20 parturients undergoing elective cesarean sections. The authors have reported a significant correlation between pre-operative electrical pain threshold, and pressure pain threshold with morphine requirements in the post-operative period. As mentioned in the article by the authors the study sample is too small to accept this correlation as very useful so that the testing could be made a routine practice. Research on such a correlation has been carried out for a long time but a clinically useful correlation has evaded the researchers so far.

In a recent study, Carvalho et al. have tried correlating labor pain with experimentally produced pain and pain caused at the time of intravenous cannulation. Only the latter was reported to have some prediction value for the time of need of epidural analgesia.\textsuperscript{[20]}
Pain sensations due to experimentally produced pain with extremes of pressure or temperature travel via C type of fibers through the lateral spinothalamic tract into the thalamus. It must be realized that experimentally induced pain may not correlate very strongly with surgical pain as surgical stimulus arising from skin traverses via A-delta type fibers and via the thalamus into a different parietal center. Thus, the whole hypothesis that experimentally produced pain would simulate surgical pain may not be true. The two may parallel only by logical basis but for example in patients with sympathetic system disorders like complex regional pain syndrome (CRPS) only C-type fibers cause pain, whereas A-delta fibers may be normal; though, CRPS is a chronic condition, unlike post-operative pain. Until well planned studies on a large number of patients actually prove this correlation, using experimentally induced pain as a measure of post-operative pain may not be justified. Although the above approach of simulating surgical pain, measuring it and eventually finding the magic doses for treating pain in patients who have low thresh hold of pain is a novel idea but a lot needs to be learnt before clinical use of these tests can be advocated.

Anjan Trikha, Preet Mohinder Singh
Department of Anaesthesiology, All India Institute of Medical Sciences, New Delhi, India

Address for correspondence: Dr. Anjan Trikha, Department of Anaesthesiology, All India Institute of Medical Sciences, New Delhi - 110 029, India. E-mail: anjantrikha@hotmail.com

References

1. Gramke HE, de Rijke JM, van Kleeft M, Raps E, Kessels AG, Peters ML, et al. The prevalence of postoperative pain in a cross-sectional group of patients after day-case surgery in a University Hospital. Clin J Pain 2007;23:543-8.

2. Fletcher D, Fermanian C, Mardaye A, Aegerter P, Pain and Regional Anesthesia Committee of the French Anesthesia and Intensive Care Society (SFAR). A patient-based national survey on postoperative pain management in France reveals significant achievements and persistent challenges. Pain 2008;137:441-51.

3. Benhamou D, Berti M, Brodner G, De Andres J, Draisci G, Moreno-Azaico M, et al. Postoperative analgesic therapy observational survey (PATHOS): A practice pattern study in 7 central/southern European countries. Pain 2008;136:134-41.

4. Sommer M, de Rijke JM, van Kleeft M, Kessels AG, Peters ML, Geurts JW, et al. The prevalence of postoperative pain in a sample of 1490 surgical inpatients. Eur J Anaesthesiol 2008;25:267-74.

5. Fillingim RB. Sex, gender, and pain: Women and men really are different. Curr Rev Pain 2000;4:24-30.

6. Fillingim RB, King CD, Ribeiro-Dasila MC, Rahim-Williams B, Riley JL 3rd. Sex, gender, and pain: A review of recent clinical and experimental findings. J Pain 2009;10:447-85.

7. Breibart W, McDonald MV, Rosenfeld B, Passik SD, Hewitt D, Thaler H, et al. Pain in ambulatory AIDS patients. I: Pain characteristics and medical correlates. Pain 1996;68:315-21.

8. Creamer P, Lethbridge-Cejku M, Hochberg MC. Determinants of pain severity in knee osteoarthritis: Effect of demographic and psychosocial variables using 3 pain measures. J Rheumatol 1999;26:1785-92.

9. Fauci J, Gordon N, Levine J. Differences in postoperative pain severity among four ethnic groups. J Pain Symptom Manage 1994;9:383-9.

10. Sherwood G, McNieill JA, Hernandez L, Penarrieta I, Petersen JM. A multinational study of pain management among Hispanics: an evidence-based approach. J Res Nurs 2005;10:403-23.

11. Ip HY, Abrishami A, Peng PW, Wong J, Chung F. Predictors of postoperative pain and analgesic consumption: A qualitative systematic review. Anesthesiology 2009;111:657-77.

12. Dworkin RH, Hartstein G, Rosner HI, Walther RR, Sweeney EW, Brand L. A high-risk method for studying psychosocial antecedents of chronic pain: The prospective investigation of herpes zoster. J Abnorm Psychol 1992;101:200-5.

13. Hsu YW, Somma J, Hung YC, Tsai PS, Yang CH, Chen CC. Predicting postoperative pain by preoperative pressure pain assessment. Anesthesiology 2005;103:613-8.

14. Strulov L, Zimmer EZ, Granot M, Tamir A, Jakobi P, Lowenstein L. Pain catastrophizing, response to experimental heat stimuli, and post-cesarean section pain. J Pain 2007;8:273-9.

15. Werner MU, Mjöbo HN, Nielsen PR, Rudin A. Prediction of postoperative pain: A systematic review of predictive experimental pain studies. Anesthesiology 2010;112:1494-502.

16. Pedersen KV, Olesen AE, Osther PJ, Arendt-Nielsen L, Drewes AM. Prediction of postoperative pain after percutaneous nephrolithotomy: Can preoperative experimental pain assessment identify patients at risk? Urolithiasis 2013;41:169-77.

17. Rago R, Forfiori F, Materazzi G, Abramo A, Collareta M, Miccoli P, et al. Evaluation of a preoperative pain score in response to pressure as a marker of postoperative pain and drugs consumption in surgical thyroidectomy. Clin J Pain 2012;28:382-6.

18. Nielsen PR, Nørgaard L, Rasmussen LS, Kehlet H. Prediction of post-operative pain by an electrical pain stimulus. Acta Anaesthesiol Scand 2007;51:582-6.

19. Luana MB, Olivia AC, Mark PB, George GB, Anthony SI, Maurice ZA, Lilian MA. Pre-operative pain sensitivity: A prediction of post-operative outcome in the obstetric population. J Anaesth Clin Pharmacol 2013;29:465-71.

20. Carvalho B, Zheng M, Aiono-Le Tagaloa L. Evaluation of experimental pain tests to predict labour pain and epidural analgesic consumption. Br J Anaesth 2013;110:600-6.

How to cite this article: Trikha A, Singh PM. Predicting post-operative pain: Still a long way to go! J Anaesthesiol Clin Pharmacol 2013;29:433-4.