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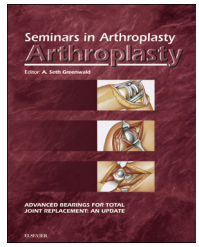

The post-operative painful knee—Clinical and societal causation

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ABSTRACT

Persistent post-surgical pain (PPSP) remains a problem after knee replacement. "Pain" is not likely to be monolithic or a single entity. It can broadly be divided into mechanical pain that is not continuous and is influenced by movement and non-mechanical pain, which is continuous and is marginally affected by activity. If the cause of mechanical pain can be identified, corrective surgery may help.

Non-mechanical pain can be subdivided into three groups as follows: sepsis, neuropathic, and perceived pain. The first two groups can be treated to some extent, but the perceived pain group that is very heterogeneous, remains a significant problem.

1. Introduction

Pain is a difficult subject because it is subjective with no objective measurement. Visual analogue scales are useful, but being subjective are hardly accurate. Some beliefs are generally accepted. Persistent post-surgical pain (PPSP) is more frequent after total knee replacement than after total hip replacement. Evidence suggests that the reported level of pre-surgical pain is a significant predictor of PPSP [1,2]. Factors such as body mass [3], age and sex are known to be of no significance.

Pain in general has been treated as a single entity [4–7]. Clinical experience, however, indicates that this is not the case. For practical purposes, orthopaedically-induced pain can largely be divided into two categories as follows: mechanical and non-mechanical, recognizing that there is always an emotional reaction to pain [8].

2. Mechanical pain

Mechanical pain refers to the pain produced by a fractured bone or the pain produced when a patient has to move a freshly inserted total knee. If the patient does not move, the pain is significantly less. This type of pain is changed in character and usually relieved by opiates.

Major technical errors are no longer frequent in knee replacement surgery. Nonetheless, patients are seen, following knee replacement surgery with knees which are painful, may feel unstable and may be stiff. The problem is usually a combination of minor errors, none of which alone would be of great significance [9]. Most of these are malrotations and maltranslations, the commonest being internal rotation of the femoral component, leading to patellar maltracking and unrecognized tibial torsion leading to extensor mechanism malfunction and overload of the medial stabilizers. If these

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problems can be identified, then further surgery may be of benefit.

Additional factors that may affect these problems, include post-traumatic arthritis with combined femoral and tibial deformities with soft tissue compromise [10]. Persistent abnormal walking patterns may influence post-operative anterior knee pain [11].

A subset of post-operative mechanical knee pain is "The production line knee."

Experience has shown that patients doing heavy physical jobs such as millwrights or those working on the production line on their feet for 8-12 h shifts should not go back to work too soon. If they do so, the knee may become irritable and remain irritable for a long time. Decades of experience with production line car plant workers in Canada suggest that they should stay off work for 6 months. If they do so, returning to line work is not an issue. Other jobs obviously need proportionally less time, but the amount of standing has to be seriously considered. Of interest, however, studies from the United States suggest half that time is necessary, that is, 9–11 weeks only [12]. At least production line workers usually have benefits, but there is one group who do not and that is hair dressers. It is very hard for many reasons to induce these workers to stay off for longer than the barest minimum time. This group of workers as a class often have a very hard time recovering from knee replacement. Additional causes are neurogenic radicular pain from the spine and undiagnosed hip arthritis.

3. Non-mechanical pain

Non-mechanical pain is usually present 24 h a day and may be worse at night. It is marginally affected by activity. It may be subdivided into three broad groups as follows: sepsis, neuropathic pain, and perceived pain. Except for the pain of sepsis, it is not really significantly relieved by opiates. An opiate may make the patient feel less stressed, but the pain character is not altered.

4. Sepsis

Infection produces non-mechanical pain, which tends to be relieved by opiates. As this pain is often produced to some extent by pressure, "non-mechanical" is obviously poor terminology. Even here, however, emotions obviously play a role. It is well known a toothache is worse at night and especially after 5:00 PM on a Friday when the dentist's office is closed.

Acute infection is usually fairly obvious, but chronic low-grade infection may be difficult to diagnose. In these cases, 40% of joint fluid cultures, may be negative and blood work may be equivocal. X-rays may help. Loosening of non-cemented components is now so rare that if seen, infection should be high on the list of suspects [13]. Local or confluent expansion of radiolucent lines under cemented components may also be indicative.

5. Neuropathic pain

This name, neuropathic, suggests that much more is known about this type of pain than is warranted. Phantom pain following an amputation was at one time felt to be due to pressure on the neuroma and attempts were made to eliminate this by burying the nerve end in the bone. The results were not convincing.

6. Complex regional pain syndrome type II (causalgia)

Complex regional pain syndrome type 11 due to a nerve injury. The infrapatellar branch of the saphenous nerve is injured in about 20% of knee replacements, but fortunately causalgia from this is very seldom seen. The numbness may produce initial distress but once the numbness is explained to the patient the distress usually goes away. It is seen in the dysaesthesia on the dorsum of the foot following recovered fibular nerve palsy, but even that is seldom severe.

7. Complex regional pain syndrome type 1 (reflex sympathetic dystrophy [RSD])

Complex regional pain syndrome type 1 is present 24 h a day, usually worse at night. It is not generally significantly affected by activity. It is not affected by opiates, which simply make the patient feel "fuzzy." There is significant skin tenderness on lightly tapping the skin and this tenderness may extend above and below the knee.

Stiffness is usually present, often progressive and trophic skin changes may occur at a much later date.

The authors believe that this condition exists [14], but the others point out that the early diagnosis is difficult and is easily "gamed." They suggest, therefore, that the diagnosis is dubious and can only be entertained in the absence of confounding factors such as lawyers, Workmen's Compensation Board, Depression, etc.

The senior author experienced some success (44%) in treating RSD following knee replacement with lumbar sympathetic blocks. If the patient did not respond to two blocks, additional injections were of no value. Lyrica, Gabapentin, and Cymbalta often have some neuropathic properties. Opiates simply produce addiction, which is merely another problem. Spinal cord stimulators may help, but the evidence is not great and the placebo effect very high.

8. Perceived pain

This is the largest group of PPSP and is the most difficult to manage. Obviously, perceived pain influences the only pre-operative predictor factor, that is, pre-opereative pain. Non-inflammatory arthritis of the knee is, after all, arthritis of the knee and it is hard to imagine on any theoretical grounds how one person's actual knee pain could be significantly different from the next person's with identical pathologic changes. The perception, therefore, is what makes the