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Chapter

Where We Come From and Are We Aware of Where We Are Going To?

Vicente Vanaclocha, Nieves Saiz-Sapena, José María Ortiz-Criado and Leyre Vanaclocha

Abstract

Chronic pain is a pathological condition that requests specific medical attention. Its treatment has been imperative since the origin of our species, taking advantage of herbs and natural remedies available in the primitive environment. Morphine has stood the test of time as has been continuously used for the past 8 millennia. The anatomical knowledge of the nociceptive sensation pathways led to the introduction of some surgical techniques directed to stop this pain transmission. Due to their aggressiveness and to the fact that they are irreversible, these techniques were soon replaced by neurostimulation procedures. Being reversible and allowing a change in stimulation parameters soon became the preferred treatment strategy. Over the years a small subset of patients continues to suffer from chronic pain refractory to the usual neurostimulation and pain-controlling medications. These patients can perhaps benefit from one of the surgical ablative procedures. Some of these techniques have been proven particularly effective throughout the years. For some limited income patients in underdeveloped countries, these techniques may be their only accessible option. Doctors have to keep in mind these surgical techniques to put them at the service of our patients in the very few cases in which they are needed. Letting these ablative techniques to die in oblivion would be a disservice to our patients.

Keywords: chronic pain, chronic pain management, surgical techniques for chronic pain management, pain clinic

1. Introduction

Pain is a defensive mechanism essential for normal life [1]. It helps us to prevent, avoid or stop any potential or real damage to us [2]. Yet, it becomes a disease in itself once it transforms into a chronic condition, oftentimes when the disease that originated the pain is no longer present [3].

The word pain itself is a matter of interest. In Arabic there are hundreds of words to express it, while in European languages, this wealth of vocabulary does not exist, and different types of pain have to be expressed through a much limited number of words [4]. As a rule a language develops more words when it has to describe a bigger amount of details of single entity. This is the case for the word

snow in Eskimo-Aleut languages [5]. In fact it is known that the verbalization of pain can somehow change its same perception [6–8].

From the very beginning, humanity has looked for means to control pain using several vegetal preparations [9–13]. The use of morphine for pain control can be dated in Mesopotamia back to the sixth millennium before Christ [14, 15]. In the Roman times, it was commonly used [16], and Galen described the use of a morphine-based ointment for the treatment of a variety of medical conditions, including chronic pain [17]. This is probably the first description of transdermal morphine use and the first known antecedent of opioid transdermal patches. Apart from the treatment of pain, morphine was used for many other medical conditions due to its antitussive, antidiarrheal and hypnotic properties [15].

In Europe during the Middle Ages, morphine became an expensive item as it had to be brought from distant places in Asia, so few people could afford it [4, 18], and yet opium (vegetal preparation containing morphine) was part of several pharmaceutical preparations [19].

Addiction to morphine was already known in Roman times [16], but it became commonplace in the Renaissance, particularly among upper class individuals [14], as they were the ones who could afford it?

In 1680, Thomas Sydenham introduced the laudanum, a mixture of opium in sherry wine [4]. This made the administration of this drug much easier and its popularity rose. Consequently, opium became a lucrative product, and its trade led to conflict, escalating to wars such as those between China and Great Britain [20, 21].

In 1803, Sertürner isolated morphine crystals and paved the way to the use of this alkaloid instead of vegetal-derived products [4, 22]. This allowed its chemical characterisation and the creation of new drugs that improved specifically the antitussive, antidiarrheal and hypnotic properties of morphine [10]. Sertürner's work also allowed a more precise control of morphine doses being administered and thus a better control of side effects and overdose.

In the nineteenth century the first non-steroidal anti-inflammatory medications were discovered [10], and local and general anaesthesia were introduced [23]. These made morphine less important as it was no longer the only analgesic medication available.

Surgical treatment of chronic pain emerged after the anatomical pathways involved in pain transmission were discovered. Cordotomy, a procedure to lesion the pathways that transmit nociceptive sensation at the spinal cord level, was introduced in 1912 by Spiller and Martin [24] and was used until the mid-twentieth century [25–27]. It was performed initially as an open procedure but was later done percutaneously [28, 29]. Another pain control surgical technique was commissural myelotomy, but it was used much more sparingly [30, 31]. These ablative procedures were also attempted at higher levels like the brainstem and the thalamus [32].

The dorsal root entry zone (DREZ) lesion was introduced by Sindou [33] and Nashold [34] in the 1960s, and ever since it has been used in brachial plexus avulsion pain. DREZ is particularly successful for this specific medical condition and is still in use up to today [35–38].

Initially mostly surgeons [39] dealt with chronic pain, but subsequently the anaesthetists became involved [40], and the first pain clinics were created [41]. The idea was to integrate in a single unit all the specialities involved in the treatment of chronic pain [42, 43].

The introduction of the posterior spinal column stimulation in the 1970s [44] and the implanted morphine infusion systems in the 1980s [45] were revolutionary, and myelotomies, cordotomies and peripheral neurectomies were soon put aside [46, 47], as reversible procedures are often preferred above ablative lesions. With posterior spinal cord stimulation, if there is any trouble to the patient or

unsatisfactory results, the stimulation parameters could be modified, the stimulation stopped altogether, or the morphine dose increased. In case of failure, other management approaches could be considered [48]. In case of the implantable morphine infusion systems, they could be implanted with ease so that physicians other than surgeons could use them.

2. Current situation

Over the years, surgeons have lost interest and importance in most pain clinics [49]. The anaesthetists have taken over [50] and provided a large selection of minimally invasive techniques and revolutionised the percutaneous and oral management of chronic pain [51]. The surgical techniques of pain management have been slowly obliterated [52] in favour of those that involve peripheral or central nervous system stimulation [53, 54] and intrathecal or epidural drug administration [55–57]. In posterior spinal cord stimulation procedures, it has been proven that the surgically implanted pad electrodes provide better results than the needle-inserted ones [58]. This has strong implications on which specialty should implant the definitive posterior spinal column electrodes.

Opioids have become a common treatment strategy, available to the patients by means apart from doctor's prescriptions [59–61]. As a result, the morphine consumption per person has been increasing in the latest years [62] to reach what has been named an opioid epidemic [46, 63–67]. Sometimes the process starts after the prescription of opioids to treat acute pain, for example, after a surgical procedure, but patients get addicted to the drug, and then it becomes difficult to make them abandon their use [68–72]. Opioids are nowadays so widespread that they can be acquired in the illegal market [61, 73]. This means that patients can use them with little or no physician control [59, 60] suffering from unwanted serious side effects and even death [74–77].

3. Future trends

Some have urged the creation of new analgesics with stronger actions and less addictive effects [78]. Ziconotide is one of them but has the disadvantage that it can only be administered intrathecally [79–81]. Some toxin-derived peptide drugs have been analysed, but the results are not consistent [82], while drugs that interact with the cellular membrane potassium channels are also being investigated [83]. Some recombinant proteins have been studied in the experimental setting, but they have not yet reached the clinical study phase [84].

In the latest years, there seems to be a renewed interest in old surgical procedures to treat chronic pain, particularly for oncological patients [85]. Under this category are the cordotomy [24], the block of the *plexus coeliacus* [86], the *nervus splacnicus* [87] or the *hypogastric nerve* [87] and the *vidian nerve* radiofrequency neurotomy [88], to mention a just few. It is currently used as a last resource for patients whose pain has not been controlled with other more conservative measures [85, 87, 89, 90]. Other procedures like the DREZ [38, 91], the zygapophyseal joint percutaneous rhizotomy [92] or the radiofrequency sacroiliac joint denervation [93] are still commonly used nowadays. Some old techniques have been improved and adapted to be minimally invasive, such as the radiofrequency thalamotomy [94, 95]. There are also new interesting additions, like the genicular nerve cooled radiofrequency neurotomy to treat chronic knee pain [96, 97], the obturator and femoral nerve sensory percutaneous neurotomy to deal with hip problems [98, 99], the shoulder pulsed radiofrequency of the suprascapular and axillary nerve to treat chronic pain shoulder [100, 101] or

the epicondyle radiofrequency treatment for chronic elbow pain [102, 103]. All these and other less common surgical procedures are there to be considered and used in selected cases [87, 104]. However the lack of interest of the surgeons in an area mostly controlled these days by the anaesthetists [49] has led to the oblivion of surgical techniques that could be of potential help to some patients, particularly in refractory cases in which all had previously failed [87]. We need to keep the knowledge of these surgical techniques that can be of potential interest to particularly refractory cases.

On the other hand, not all patients worldwide have access to the same options [105–108]. Economic issues can make some neurostimulative or implantable pump techniques unaffordable that might be advisable in a patient [109–111]. Nevertheless, some of the old surgical ablative procedures might be affordable [87, 112] as they have a much lower monetary cost [110] and may be beneficial for these patients. Hence, surgical control of pain has to remain a known alternative, sometimes preferable to long-term opioid use and its associated side effects [113].

The continuation of the study of the basic mechanisms of pain production, transmission, perception and induced suffering is imperative [114–117], as is the investigation of new treatment strategies. A very promising area is fibromyalgia [118, 119], a condition for which pathological studies are negative [120] in the affected individuals and yet they claim to be in constant pain. This also happens in other medical conditions such as schizophrenia, and nobody will dare to state that schizophrenia does not exist because it lacks a previse pathological correlate [121]. Recent studies have highlighted neurotransmitter changes in chronic pain that need to be thoroughly analysed and studied [122–124].

4. Situation in each hospital

Each country, each area and even each hospital pose a particular scenario. Over the years many neurosurgeons have lost interest in the chronic pain treatment and retreated from the pain clinics [49]. We need to change this trend and get more involved in this area [52], so that our capabilities can be requested when they could be of particular help, benefitting patients which lack viable alternatives.

This book is a plea to awaken physicians in some ablative procedures that should have never been forgotten.

5. Conclusions

Treatment of chronic pain demands a multidisciplinary approach. Everybody is welcomed and needed. In the latest years, anaesthetists have taken a big role in this arena, but surgeons need to keep ready for those uncommon cases in which everything fails. In some low-income countries or patients with refractory pain, some ablative procedures might be an option that their pockets can afford. Surgical techniques of chronic pain management should not fall into the oblivion. Continuous research is needed to better understand the chronic pain condition and to find new remedies against it.

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