

LETTERS TO EDITOR

THE VACUUM TECHNIQUE IN THE SPINAL SURGERY

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Abstract. *Mechanical injuries of the spinal column and the spinal cord (medulla spinalis) are the reason for surgery interventions on the spine - the spinal surgery. However, there are cases when it is necessary to make the surgical interventions on the healthy spine in order to remove the remaining neurogenic ache due to the injury of other organs. DREZ (Dorsal Root Entry Zone) surgery is a practical method for the successful treatment of the central neurogenic ache. The surgeon makes the controlled destruction of a sensitive nerve of the last horn of the gray mass of the medulla. In such a way it stops sending painful pulses from the injured place through the spine to the brain. In surgical practice dominates the thermal destruction (radiofrecuencial, ultrasound, laser - techniques), where a permanent lesion is achieved at the temperatures $t > 45^{\circ}\text{C}$ [1]. This paper will present the vacuum technique for making mechanical destruction of a sensitive nerve of the gray mass. This technique has been used in the course of several years by neurosurgeon M. Spaić at MMA in Belgrade [1]. This technique is already highly evaluated by well-known surgeons [1] as it is simple, cheap with almost the same risk of success.*

1. INTRODUCTION

There is a great number of scientific papers in the field of spinal surgery devoted to neurogenic posttraumatic pain [1,2,3,4,6,7,]. There, surgical techniques are proposed, theoretically and practically, of eliminating the posttraumatic neurogenic pain, with the patients who were previously treated for serious mechanical injuries and burns. In about 10% of the hurt people the pain intensity reaches such a level that the narcotic medicaments or radical surgical treatment [1] is indispensable. This problem is even more intensified by the fact that the patients who, due to the injury, were enabled by partial or full immobility are exposed to painful sufferings. English surgeon Page was the first to notice the link of the spinal injury and the chronic pain. In 1883. in his book 'Injuries of the spine and the spinal shock' he presented the description of 234 injuries, describing the phenomenon of the pain in the paralysed extremities [1]. Later on the surgeons had analyzed this problem, theoretically and practically, and reached the following conclusion: in the system of the organization of the pain transmission the

dorsal horn of the gray mass of the spinal cord is the first integrative relay centre of the central nerve system (CNS) for the painful pulses. The dorsal horn is the entrance terminal over which the painful signal is sent towards higher recognizing centres (towards the brain). The destruction of these nerves interrupts the sending of painful signals to the brain, and the patient is liberated of the chronic ache.

By the experiments on cats and dogs the surgeons found out [2] that the permanent lesion (destruction) of the dorsal horn of the gray mass is achieved by a thermal destruction at the temperatures of $t > 45$ degrees C. The surgical intervention is made in such a way that the radiofrequency DREZ electrode is introduced into the space of the entrance root zone, adjusting the temperature and the coagulation duration time parameters. The success of this surgical technique is 80%, while that of the technique of ultrasound DREZotomy is 96%. Lately very good results are achieved by laser destruction, too.

The risk of such surgeries always exists due to the use of complicated and expensive electrical devices. In the absence of such apparatuses DREZ surgery can be performed by a vacuum technique, which is already applied by one of the authors of this paper Dr M. Spaić at the MMA in Belgrade. The success of this method is very high (over 90%) but the number of the patients is small (about 15), in order to infer the final conclusion.

2. METHODOLOGY

The first observation of the specificity of the gray mass structure, particularly of the back medullar horn, was made two centuries ago by Luigi Rolando, who had described the gelatinous layer of the back horn, which is today denoted by his name - *substantia gelatinosa Rolando* [4]. Later on B. Rexed had systematized the gray mass into 10 fields - lamina, according to the morphological cell architecture. According to that systematisation the first two laminae are thermo receptors, and the next 4 laminae are mechano receptors. The sensitive nerves for the transmission of thermal and mechanical sensations from the injured site to the brain are in the question. The destruction of these laminae interrupts the main relay and the painful pulses do not pass through the medulla to the brain.

The thermal destruction by the radiofrequency method is made by a special electrode (Figure 1) which is inserted 3-5 mm deep into the back horn of the gray mass, as presented in Fig.2. Upon the closure of the electrical circuit, the electrical power is converted into the heat by means of a special radiofrequency generator (Fig. 3). The permanent lesion (destruction) is achieved at the temperatures $t > 45$ degrees C, Fig. 4.

Fig. 2. in essence shows also the destruction vacuum technique by means of the aspirator; instead of the electrode a siring is used whose needle has the external diameter 1 mm and the interior one 0.6 mm. The aspiration is made at the depth (3-5) mm. A surgical intervention is performed by using a microscope (augmentation till 20 times) with a permanent surgeon's visual control. The vacuum pressure $p_v = 0-50$ kPa is sufficiently strong to destroy the gray mass. The white mass is not jeopardized in that as it has 4 times higher viscosity than the gray mass [5]. That is why the attention is to be paid not to jeopardize side vegetative horns of the gray mass on the occasion of the destruction. Dr. Milan Spaić claims that on the occasion of a surgical intervention he has a full visual control through the microscope. By this method besides the destruction of the back horn of the gray mass its removal from the modulle is made, which is positive from the medical point of view.

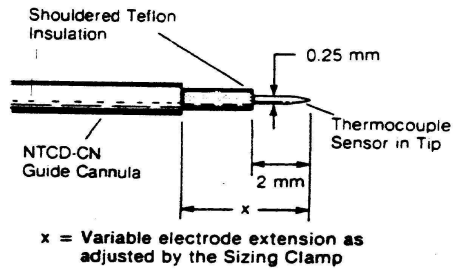


Fig. 1. The look of the electrode used in the radiofrequency DREZotomy

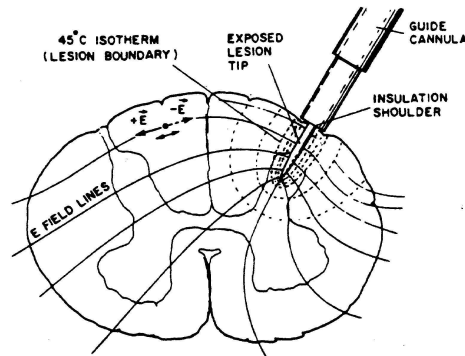


Fig. 2. Radiofrequency DREZotomy -by the electrode. The vacuum desstruction by the aspirator instead of the electrode.

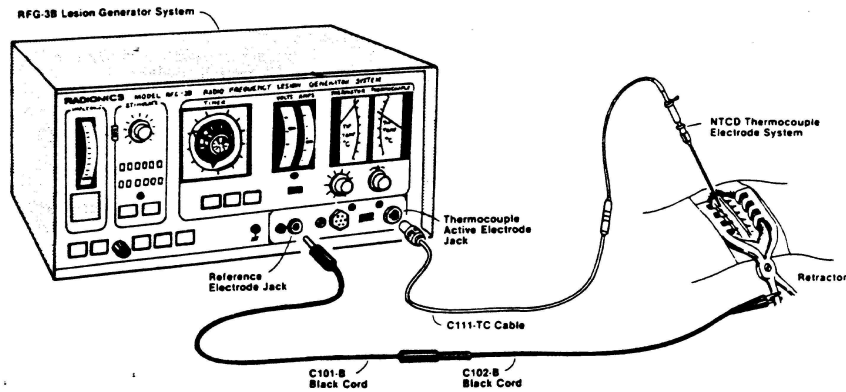


Fig. 3. Radiofrequency generator

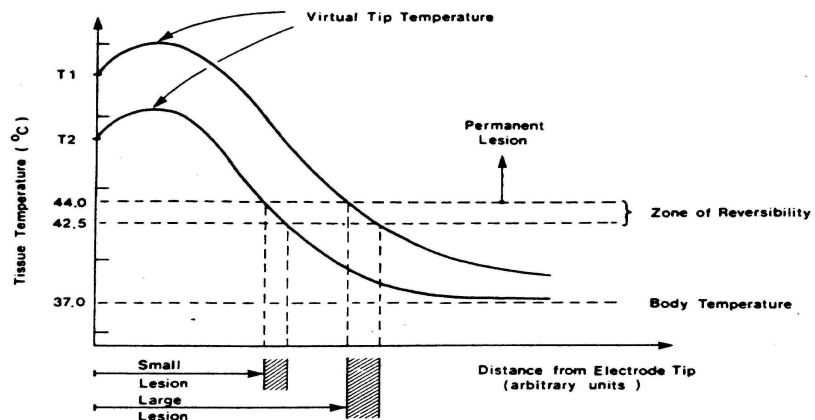


Fig. 4. The diagram of the thermal destruction

3. CONCLUSION

After 15 surgeries performed by the vacuum technique it can be inferred:

- The vacuum technique in the Spinal surgery provides good results in the field of surgical treatment of chronic neurogenic pain -DREZ surgery.
- Compared with other DREZ surgeries (radiofrequency, ultrasound and laser techniques) the vacuum technique does not use expensive electronic instruments, so that it is much cheaper.
- The risk of the surgery is approximately equal to other techniques.

At the congress of Yugoslav surgeons in Belgrade in 1999 this technique was praised by well-known, experienced neurosurgeon Dr. Repac. Apart from that the vacuum technique of aspirating the sensitive nerve encountered a good reception on the part of known names in the world of neurology [1]. M. Sindou, P. Mertens, M. Weal Department of Neurosurgery, Hospital neurologique Pierre Wertheimer, University of Lyon, France.

Remark: The figures presented in this paper are taken from literature [2].

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VAKUUMSKA TEHNIKA U SPINALNOJ HIRURGIJI

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Mehaničke povrede kičmenog stuba i kičmene moždine (medula spinalis) su razlog hirurške intervencije na kičmi - spinalna hirurgija. Medjutiim ima slučajeva kada je potrebno obaviti hiruršku intervenciju na zdravoj kičmi u cilju eliminisanja zaostalog neurogenog bola zbog povrede drugih organa. DREZ (Dorsal Root Entry Zone) hirurgija je jedna praktična metoda uspešnog lečenja centralnog neurogenog bola. Lekar hirurg vrši kontrolisanu destrukciju senzitivnog nerva zadnjeg roga sive mase medule. Na taj način prekida slanje bolnih impulsa od povredjenog mesta preko kičme do mozga. U hirurškoj praksi dominira toplotna destrukcija (radiofrekventna, ultrazvučna, laserka – tehnika), pri kojoj se permanentna lezija postiže na temperaturama $t \geq 450^{\circ}\text{C}$ [1]. U našem radu biće prikazana vakumska tehnika, kojom se vrši mehanička destrukcija senzitivnog nerva sive mase. Ovu tehniku već više godina koristi neurohirurg M. Spaić na VMA u Beogradu [1]. Ova tehika je već dobro ocenjena od strane poznatih hirurga [1], jer je jednostavna, jeftina uz približno isti rizik uspešnosti.