

Abstract

Today, miniinvasive operations are part of modern medicine and in recent years have partially replaced open methods. The aim of this study was to compare radiological, histochemical and histological changes of the erector spinae muscle in patients with thoracolumbar spine fractures treated with open (OPEN) and miniinvasive (MISS) stabilization. The purpose was not to evaluate one method as better or worse, it was only a comparison and finding out the advantages and disadvantages of individual operations. During the study, we compared both the above-mentioned differences in the quality of the erector spinae muscle and laboratory changes in blood levels of muscle enzymes, we compared the duration of operations, the accuracy of insertion of transpedicular screws, blood loss, kyphotization of spine segments and exposure of radiation. It has been hypothesized that muscle damage in all factors will be lower in MISS than in OPEN.

A total of 38 patients with type A and B fractures according to the Vaccar classification, 19 underwent MISS surgery and 19 at the OPEN method were included in the prospective randomized study. The average age of the whole group was 46.4 years (18 - 68), the average age for MISS procedures was 42.6 (18 - 66), for OPEN was 48.7 (19 - 68). Only monotrauma of the TL spine was diagnosed in all patients enrolled in the study. If other injuries were diagnosed, these patients were not included in the study.

Muscle samples were taken from the fracture area and from the contralateral side during stabilization and extraction and sent for histological and histochemical examination. The difference in the intensity of fibrotic and atrophic changes and the ratio of individual muscle fibers in individual methods was determined. The other part of the study compared the condition of muscles on preoperative nuclear magnetic resonance (MRI) with the condition on MRI performed 3 months after implants extraction. Again, we evaluated the differences in the amount of fibrotization and muscle atrophy between the two methods. To compare laboratory values of muscle enzymes, we took creatinekinase (CK) and myoglobin (MYO) at intervals in the perioperative period, up to several times a day until the levels normalized. We drew the values of the duration of the operation, blood loss and intensity of exposure of radiation from perioperative records. Changes in the segmental curve and the degree of kyphotization of the vertebrae were obtained from the size of the angles measured at intervals throughout the study, immediately after the injury and up to two years after removal of the implants.

From the results, we found and confirmed the hypothesis that in both the histological and histochemical samples and in the MRI image, the spine muscle corset is damaged to a greater extent in OPEN than in MISS. In the biochemical part of the study, in contrast to the assumption

that the muscle will be less damaged during surgery in MISS than in OPEN, the exact opposite was shown. Muscle enzyme levels rose almost twice as high during MISS as with OPEN. The reason is probably higher local muscle contusion and the development of a minicompartiment in non-drenated MISS procedures. The results for the length of the operation and the exact location of the transpedicular screws did not confirm the difference between the methods, blood losses were significantly higher in OPEN, irradiation rate significantly higher in MISS and comparably in both methods we found the similar rate of loss of correction of individual spine curves over time.

Minimally invasive surgeries have their place in the treatment of TL spine fractures, but not for all types of injuries. They are not suitable where decompression and quality posterior spondylodesis are required. MISS procedures clearly save the spinal muscle corset in long-term monitoring.