

POSTOPERATIVE COMPLICATIONS AND FRACTURE CONSOLIDATION TIME IN ELDERLY PATIENTS WITH PROXIMAL FEMUR FRACTURES DEPENDING ON THE ANTIOXIDANT THERAPY APPROACH

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Abstract

A total of 107 patients aged 60–89 years with proximal femur fractures were divided into a main group (n=43; antioxidant therapy guided by oxidative stress markers), a comparison group (n=41; antioxidants by a standard scheme) and a control group (n=23; no antioxidants). The total frequency of postoperative complications was 18.6%, 31.7% and 60.9%, respectively; delayed consolidation occurred in 7.0%, 12.2% and 21.7% and nonunion in 2.3%, 4.9% and 13.0% of patients. Mean consolidation time was 12.4 ± 1.2 , 14.1 ± 1.4 and 16.3 ± 1.6 weeks. Earlier union and fewer complications corresponded to a more pronounced decrease of malondialdehyde and a more complete restoration of superoxide dismutase activity. Antioxidant therapy guided by biochemical markers was more effective than a standard scheme.

Keywords

proximal femur fracture, elderly patients, antioxidant therapy, postoperative complications, fracture consolidation, nonunion, oxidative stress.

**ПОСЛЕОПЕРАЦИОННЫЕ ОСЛОЖНЕНИЯ И СРОКИ КОНСОЛИДАЦИИ
ПЕРЕЛОМОВ У ПАЦИЕНТОВ ПОЖИЛОГО ВОЗРАСТА С
ПЕРЕЛОМАМИ ПРОКСИМАЛЬНОГО ОТДЕЛА БЕДРЕННОЙ КОСТИ В
ЗАВИСИМОСТИ ОТ ПОДХОДА К АНТИОКСИДАНТНОЙ ТЕРАПИИ**

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Аннотация. 107 пациентов в возрасте 60–89 лет с переломами проксимального отдела бедренной кости разделены на основную группу (n=43; антиоксидантная терапия с учётом показателей оксидативного стресса), группу сравнения (n=41; антиоксиданты по стандартной схеме) и контрольную группу (n=23; без антиоксидантов). Общая частота послеоперационных осложнений составила 18,6%, 31,7% и 60,9% соответственно; замедленная консолидация наблюдалась у 7,0%, 12,2% и 21,7%, несращение — у 2,3%, 4,9% и 13,0% пациентов. Средний срок консолидации — $12,4 \pm 1,2$; $14,1 \pm 1,4$ и $16,3 \pm 1,6$ недели. Более раннее сращение и меньшее число осложнений соответствовали более выраженному снижению малонового диальдегида и более полному восстановлению активности супероксиддисмутазы. Антиоксидантная терапия, назначаемая с учётом биохимических маркеров, была эффективнее стандартной схемы.

Ключевые слова: перелом проксимального отдела бедренной кости, пожилой возраст, антиоксидантная терапия, послеоперационные осложнения, консолидация перелома, несращение, оксидативный стресс.

Relevance. Complications and delayed union after surgery for proximal femur fractures remain a major problem in elderly patients. The postoperative period is accompanied by oxidative stress: in 198 patients aged over 65 years undergoing hip fracture surgery, malondialdehyde measured on postoperative day 1 was an independent risk factor for postoperative cognitive dysfunction [1], while oxidative stress and the

Nrf2-mediated antioxidant response are discussed as clinically important factors of fracture healing [2]. It is therefore relevant to compare the outcomes of antioxidant therapy prescribed with and without regard to oxidative stress markers.

Objective. To compare the frequency of postoperative complications and the timing of fracture union in elderly and senile patients with proximal femur fractures who received different treatment tactics, and to determine the role of differentiated antioxidant therapy in the course of reparative osteogenesis.

Materials and Methods. The study included 107 patients aged 60–89 years treated in trauma departments. In the main group (n=43), closed reduction with an external fixation device was followed by locked intramedullary nailing or plate-and-screw fixation, and antioxidant therapy was prescribed with regard to the initial values and postoperative dynamics of lipid peroxidation and antioxidant defense markers. The comparison group (n=41) received standard surgical treatment with antioxidant therapy according to a standard scheme, while the control group (n=23) received standard surgical treatment without determination of oxidative stress markers and without antioxidants. The outcomes were the structure of postoperative complications and the time of consolidation, assessed clinically and by radiography (computed tomography when necessary) in follow-up examinations.

Results and Discussion. The total frequency of complications was 18.6% (8 patients) in the main group, 31.7% (13 patients) in the comparison group and 60.9% (14 patients) in the control group, i.e. more than three times lower in the main group than in the control group. Inflammatory complications were registered in 9.3%, 14.6% and 26.1% of cases, delayed consolidation in 7.0%, 12.2% and 21.7%, and nonunion in 2.3%, 4.9% and 13.0% of patients, respectively. The share of each complication grew as the treatment tactic became simpler. Mean consolidation time was 12.4 ± 1.2 weeks in the main group, 14.1 ± 1.4 weeks in the comparison group and 16.3 ± 1.6 weeks in the

control group, so the main and control groups differed by 3–4 weeks. The intermediate position of the comparison group suggests that antioxidant therapy prescribed without biochemical monitoring produces only a partial effect. Earlier union and fewer complications corresponded to a more pronounced decrease of malondialdehyde (4.8 ± 0.3 versus 6.8 ± 0.5 nmol/L on days 14–21) and a more complete restoration of superoxide dismutase activity.

Conclusion. The combination of optimized surgical tactics with antioxidant therapy guided by oxidative stress markers lowers the frequency of inflammatory complications, delayed union and nonunion and shortens fracture consolidation in elderly patients. Antioxidant therapy prescribed by a standard scheme, without taking biochemical markers into account, has a smaller effect, which supports the differentiated approach.

References

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