COST-EFFECTIVENESS OF OXIDATIVE STRESS–GUIDED ANTIOXIDANT THERAPY IN ELDERLY PATIENTS WITH PROXIMAL FEMUR FRACTURES

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Abstract. The economic feasibility of differentiated antioxidant therapy in elderly and senile patients with proximal femur fractures was assessed by cost/effectiveness analysis of direct costs (surgery, drug therapy, treatment of complications and length of hospital stay). The cost of treating one patient was 4,200,000 UZS with the traditional tactic and 4,850,000 UZS with the proposed method (an additional 650,000 UZS, about 15.5%), while effectiveness increased from 68% to 88%. The cost/effectiveness ratio was 3,250,000 UZS, which corresponds to an additional 32,500 UZS for each percentage point of effectiveness gained. The proposed method is economically feasible and provides a lower complication rate (18.6% in the main group versus 31.7% in the comparison group and 60.9% in the control group).

Keywords: proximal femur fracture, elderly patients, antioxidant therapy, oxidative stress, cost-effectiveness analysis, direct costs, economic feasibility.

ЭКОНОМИЧЕСКАЯ ЭФФЕКТИВНОСТЬ АНТИОКСИДАНТНОЙ ТЕРАПИИ, ОСНОВАННОЙ НА ОЦЕНКЕ ОКСИДАТИВНОГО СТРЕССА, У ПАЦИЕНТОВ ПОЖИЛОГО ВОЗРАСТА С ПЕРЕЛОМАМИ ПРОКСИМАЛЬНОГО ОТДЕЛА БЕДРЕННОЙ КОСТИ

Аннотация. С помощью анализа «затраты — эффективность» оценена экономическая целесообразность дифференцированной антиоксидантной терапии у пациентов пожилого и старческого возраста с переломами проксимального отдела бедренной кости; учитывались прямые затраты (операция, лекарственная терапия, лечение осложнений, длительность госпитализации). Стоимость лечения одного пациента при традиционной тактике составила 4 200 000 сум, при предлагаемом методе — 4 850 000 сум (дополнительно 650 000 сум, около 15,5%), при этом эффективность возросла с 68% до 88%. Коэффициент «затраты — эффективность» составил 3 250 000 сум, что соответствует дополнительным 32 500 сум на каждый процентный пункт прироста эффективности. Предлагаемый метод экономически целесообразен и обеспечивает меньшую частоту осложнений (18,6% в основной группе против 31,7% в группе сравнения и 60,9% в контрольной).

Ключевые слова: перелом проксимального отдела бедренной кости, пожилой возраст, антиоксидантная терапия, оксидативный стресс, анализ «затраты — эффективность», прямые затраты, экономическая целесообразность.

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Relevance. Proximal femur fractures in elderly patients are associated with a high risk of complications, and postoperative oxidative stress has been linked to adverse outcomes: in 198 patients aged over 65 years undergoing hip fracture surgery, malondialdehyde on postoperative day 1 was an independent risk factor for postoperative cognitive dysfunction [1]. Oxidative stress is also considered an important factor of fracture healing [2]. Antioxidant therapy guided by oxidative stress markers requires additional drug and laboratory costs; therefore, its clinical advantages should be assessed together with its economic feasibility.

Objective. To evaluate the economic feasibility of the differentiated antioxidant therapy method in the treatment of elderly and senile patients with proximal femur fractures using cost/effectiveness analysis.

Materials and Methods. The analysis included direct costs: the cost of surgical intervention and drug therapy, as well as the costs related to the treatment of postoperative complications and the length of hospital stay. Treatment effectiveness was defined by the frequency of positive clinical outcomes, namely a lower number of complications, faster fracture consolidation and recovery of functional activity. The cost/effectiveness ratio was calculated by the formula of Phillips and Thompson (1999): C/E = (C2 − C1) : (E2 − E1) × 100, where C1 and C2 are the total costs of the first and the second treatment method, E1 and E2 are their effectiveness, and 100 is the calculation coefficient.

Results and Discussion. The cost of treating one patient with the traditional tactic was 4,200,000 UZS, whereas with the proposed method it was 4,850,000 UZS. The additional 650,000 UZS (about 15.5%) is explained by the use of antioxidant therapy. At the same time, effectiveness increased from 68% with the traditional tactic to 88% with the proposed method. Thus, C/E = (4,850,000 − 4,200,000) : (88 − 68) × 100 = 650,000 : 20 × 100 = 3,250,000 UZS, which corresponds to an additional 32,500 UZS for each percentage point of effectiveness gained. The higher effectiveness is supported by clinical data: the total frequency of postoperative complications was 18.6% in the main group versus 31.7% in the comparison group and 60.9% in the control group, and the mean consolidation time was 12.4 weeks versus 16.3 weeks in the control group. A lower number of complications and a shorter period of bone union reduce the need for repeated hospitalizations and interventions and shorten hospital stay, which should compensate for the initial increase in direct costs.

Conclusion. Despite a slight increase in direct costs, the proposed method provides a higher level of clinical effectiveness and a lower complication rate, so it is economically feasible and can be recommended for implementation in clinical practice.

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