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MEDICAL SCIENCES

IMPACT OF OBESITY ON PAIN SEVERITY IN THE EARLY PERIOD AFTER ARTHROSCOPIC ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION OF THE KNEE

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Introductions. Injury to the anterior cruciate ligament (ACL) is among the most clinically significant knee joint injuries in modern traumatology and orthopedics. This is due to the high incidence of such injuries among young working-age individuals, the prolonged rehabilitation period, and the substantial socioeconomic consequences [1–3].

In Ukraine, the problem of ACL injuries at the population level remains insufficiently studied. The absence of national trauma registries and the limited number of epidemiological studies complicate an objective assessment of the prevalence of this pathology. At the same time, international analytical data indicate an increase in the overall injury rate in Ukraine, particularly musculoskeletal injuries, which is associated with both socioeconomic factors and the consequences of military actions [4]. The growing number of knee joint injuries, including injuries to the ligamentous apparatus, is accompanied by an increasing need for orthopedic care, reconstructive interventions, and long-term rehabilitation, thereby creating an additional burden on the healthcare system.

Particular attention in the study of ACL injury outcomes should be paid to concomitant comorbid conditions, primarily obesity. Excess body weight increases

the risk of injury, may complicate the course of surgery, the early postoperative period, and functional recovery of the knee joint, and is also associated with a higher likelihood of developing post-traumatic osteoarthritis. Given the steady global increase in obesity prevalence, the relevance of studying its impact on musculoskeletal pathology, particularly knee joint injuries, is continuously growing.

According to current studies, excess body weight is associated with an increased risk of unfavorable outcomes after arthroscopic ACL reconstruction. In particular, obesity is associated with a higher incidence of osteoarthritis and a greater need for repeat surgical interventions in the long term [5]. This is especially important in patients with isolated ACL injury, since even in the absence of concomitant intra-articular damage, excessive mechanical loading and metabolically mediated inflammation may accelerate degenerative changes.

In this regard, predicting the risk of an unfavorable course of the early postoperative period, particularly severe pain syndrome, in patients with isolated ACL injury and obesity is of important practical significance. This makes it possible to improve the prognosis of treatment outcomes, optimize surgical strategy and postoperative rehabilitation, and reduce the risk of further complications [6–8].

Aim. To evaluate the impact of obesity and clinical and laboratory parameters on pain intensity in the early postoperative period in patients with isolated (ACL) injury following arthroscopic reconstruction, and to identify predictors of an unfavorable course during this period.

Materials and methods. A prospective single-center comparative study was conducted in which pain intensity was assessed using the visual analog scale (VAS) in patients with isolated ACL injury and obesity (body mass index ≥ 30 kg/m²). The VAS was used as one of the most informative tools for the quantitative assessment of pain after injuries and reconstructive interventions on the knee joint.

During 2022–2024, 90 patients aged 19 to 67 years with isolated ACL injury of the knee joint were examined while undergoing treatment in the trauma department of the Municipal Non-Profit Enterprise of the Kharkiv Regional Council “Regional Clinical Hospital.” The patients were divided into two groups. The main group

included 38 patients with isolated ACL injury and obesity. The control group consisted of 52 patients with isolated ACL injury without obesity.

To assess the influence of the studied factors (medical history, clinical, and laboratory characteristics) on pain severity during the first week after reconstructive arthroscopy, univariate and multivariate regression analyses were performed with the construction of the corresponding models and evaluation of the regression coefficients.

Results and discussion. According to the obtained results, in the first week after arthroscopic ACL reconstruction, the main predictor of pain severity was the preoperative pain level according to the VAS, which retained a statistically significant association with postoperative pain in all models ($\beta=0.361-0.406$; $p=0.041-0.073$). In most models, the presence of obesity showed only a trend toward an association with a higher pain level ($\beta=0.361-0.405$; $p=0.041-0.073$); however, it became statistically significant in certain multivariate models, particularly when accounting for medical and social indicators ($\beta=0.405$; $p=0.041$), coagulation profile parameters ($\beta=0.388$; $p=0.046$), and selected complete blood count parameters ($\beta=0.406$; $p=0.042$). Other medical-social, physical, and most laboratory indicators had no independent effect on pain intensity; among lipid parameters, a separate association was identified only for triglycerides ($\beta=0.252$; $p=0.028$) and the atherogenic coefficient ($\beta=0.286$; $p=0.041$).

Conclusions.

1. The primary predictor of postoperative pain intensity in patients with isolated ACL injury is the preoperative pain level measured by the visual analog scale (VAS), which maintains a statistically significant association across all constructed models.

2. Obesity shows a tendency toward association with higher pain intensity in the early postoperative period; in certain multivariate models, this association reaches statistical significance.

3. Among laboratory parameters, an independent effect on pain intensity was identified only for specific lipid indices, namely triglyceride levels and the

atherogenic coefficient.

4. Most other medical-social, physical, and laboratory variables do not demonstrate an independent effect on pain severity in the early postoperative period.

5. Identification of risk factors for increased pain intensity may improve the prediction of treatment outcomes, optimize postoperative patient management, and reduce the likelihood of complications.

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