

<https://doi.org/10.52889/1684-9280-2021-4-60-60-64>

UDC 617.3; 616-089.23; 616-001

IRSTI 76.29.41

Short Communication

Assessment of the Risk of Complications in Patients with Fractures of the Long Bones of the Lower Extremity Against the Background of Metabolic Syndrome

Ravshan Yakubdjanov¹, S. Madrahimov², Karimov Murodulla³

¹ Postgraduate student of the Department of Traumatology-Orthopedics and Military Field Surgery, Tashkent Medical Academy, Tashkent, Uzbekistan. E-mail: ravshan.yakubdjanov@gmail.com

² Traumatologist-orthopedist of the Department of Traumatology, Multidisciplinary Clinic of the Tashkent Medical Academy, Tashkent, Uzbekistan. E-mail: m_sarvar91@mail.ru

³ Head of the Department of Traumatology-Orthopedics and Military Field Surgery, Tashkent Medical Academy, Tashkent, Uzbekistan. E-mail: m.karimov@mail.ru

Abstract

The aim of the study is to improve the results of pre- and postoperative treatment of fractures of the long bones of the lower extremity against the background of metabolic syndrome, by developing a new method of prediction.

Methods. In a retrospective single-center study, the outcomes of treatment of fractures of the proximal femur were analyzed in 95 patients (the main group) who applied to the Multidisciplinary Clinic of the Tashkent Medical Academy from 2016 to 2021.

The comparison group included 102 patients with fractures of the long bones of the lower extremity, who were treated in our clinic from January 2014 to December 2016, their data were taken from the medical archive and analyzed retrospectively. Of these, 62 (66.2%) were women in the main group, 66 were female in the control group (69.36%). The average age was 67.7±11.6 years.

The criteria for inclusion in the study were: age over 18 years, severity of injury less than 15 points on the ISS (Injury Severity Score) scale, full stay in our clinic (without transfer to others), duration of hospitalization for more than a day. The comorbidity category was determined by ASA (American Society of Anesthesiologists).

Results. According to the type of fractures in the main and control groups, intra-articular fractures prevailed – 70,7% and 67,6%, respectively, extra-articular fractures in the main and control groups, therefore, amounted to 29,2% and 32,3%. Patients of the main group with high risk (n=17) were treated conservatively for cardiological, endocrinological, neurological comorbidities to optimize the somatic status. After optimization of the somatic status with a repeated assessment of the risk of possible development of postoperative complications, the patients of the main group were distributed as follows, low risk (<10%) - 10 patients (15,4%), average risk (10-30%) - 44 patients (67,7%), high risk (> 30%) - 11 patients (16,9%). Thus, the number of high-risk patients was reduced by 1,54 times ($X^2=30,2$, $p < 0,05$) due to distribution into lower-risk groups, including the low-risk group.

Conclusion. The effectiveness of the nomogram for prognostic assessment of the risk of developing possible complications in patients with fractures of the proximal femur is confirmed.

Key words: lower limb fractures, metabolic syndrome, fracture complications, orthopedics of injury control.

Corresponding author: Karimov Murodulla, Head of the Department of Traumatology-Orthopedics and Military Field Surgery, Tashkent Medical Academy, Tashkent, Uzbekistan.

Postal code: 100109

Address: Uzbekistan, Tashkent, Farobiy 2

Phone: +998 90 959 86 16

E-mail: m.karimov@mail.ru

J Trauma Ortho Kaz 2021; 4 (60): 60-64

Received: 12-11-2021

Accepted: 28-11-2021



This work is licensed under a Creative Commons Attribution 4.0 International License

Introduction

Common perioperative complications in fractures of long tubular bones include pulmonary embolism (PE), deep vein thrombosis, wound infections, complications from the cardiovascular system [1,2].

With metabolic syndrome, surgical treatment is often required. However, the refusal of surgery can lead to a vicious circle, an increase in the influence of negative metabolic stress - hypercoagulation, hypertension, hypokinesia, and in some cases lethality. In this category of patients, there is a higher incidence of infection, non-healing of wounds and other undesirable phenomena, and

Material and methods

In a retrospective single-center study, the outcomes of treatment of fractures of the proximal femur were analyzed in 95 patients who applied to the Multidisciplinary Clinic of the Tashkent Medical Academy from 2016 to 2021.

These patients formed the main group, and the comparison group included 102 patients with fractures of the long bones of the lower extremity, who were treated in our clinic from January 2014 to December 2016, their data were taken from the medical archive and analyzed retrospectively. Of these, 62 (66.2%) were women in the main group, 66 were female in the control group (69.36%). The average age was 67.7 ± 11.6 years.

The criteria for inclusion in the study were: age over 18 years, severity of injury less than 15 points on the ISS

Results

The most distinctive features of our method of forecasting and choosing tactics for the treatment of patients with long bone fractures on the background of MS were the following:

1. Quantitative indicators of a concomitant condition, such as metabolic syndrome, such as blood

the management of these patients requires multitasking medical care. Thus, the question of choosing the optimal approach to treatment, namely, surgery, and predicting possible postoperative complications is the cornerstone in the treatment of patients with long bone fractures associated with metabolic syndrome.

The aim of the study is to improve the results of pre- and postoperative treatment of fractures of the long bones of the lower extremity against the background of metabolic syndrome, by developing a new method of prediction.

(Injury Severity Score) scale, full stay in our clinic (without transfer to others), duration of hospitalization for more than a day. To solve this problem, we proposed a new method for choosing the tactics of surgical treatment for fractures of the long bones of the lower extremity in patients with metabolic syndrome (IAP 2020 0112 from 03.03.2020).

The evaluation of the optimized preparation of the patient for surgery was carried out using a nomogram developed by us. Fractures of the proximal femur were diagnosed according to ICD-10 on the basis of routine clinical studies, X-ray diagnostics, multispiral computed tomography (MSCT), if there was a need for verification.

sugar levels, systolic and blood pressure values, diabetic nephropathy, body mass index, are taken into account (Figure 1).

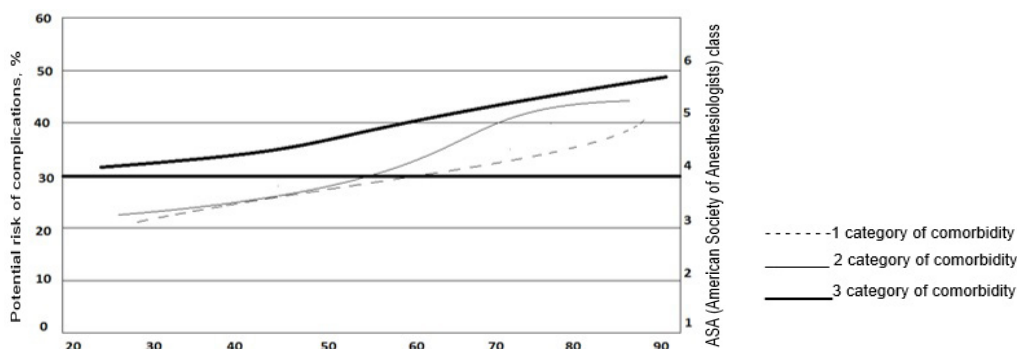


Figure 1 - Graph (nomogram) for determining the potential risk of complications in patients with fractures of the long bones of the lower limb against the background of the metabolic syndrome

This is how the category of comorbidity of metabolic syndrome is determined:

-0 - compensated, blood sugar level ≤ 6.1 mmol / l, blood pressure - $\leq 139 / 89$ mm Hg, BMI - 30-34.9 kg / m², target organ damage is absent;

-1-2 - subcompensated, blood sugar level 6.1 - 11.1 mmol / l, blood pressure - $\leq 159 - 179 / 99 - 109$ mm Hg, BMI - 35 - 39.9 kg / m², target organ damage - 1;

-3 - decompensated, blood sugar level ≥ 11.1 mmol

/ l, blood pressure - $\geq 180 / 110$ mm Hg, BMI - ≥ 40 kg / m², target organ damage - 2 or more.

2. The number of affected target organs (vessels, kidney, liver, peripheral nervous system) is taken into account, which is of particular importance, both from the side of the general somatic status and bone fusion or its absence. Considering the influence of comorbid pathology on clinical manifestations, diagnosis, prognosis and treatment of many diseases, it is multifactorial.

3. The treatment approach will be the same as for polytrauma, which is based on the tactics of "Damage Control Orthopedics", which initially consists of preliminary immobilization of long tubular bones-mainly fractures of the lower limb in order to achieve the benefits of early treatment and minimize the risk of complications such as severe pain, fat embolism, blood coagulopathy, systemic inflammatory response syndrome, massive bleeding, triggering a deadly triad, and traumatic consequences of a major operation for a patient who is already injured (the "second hit" effect).

4. The state of not only arterial blood flow is taken into account (systolic and diastolic, pulse pressure, duplex scanning of the vessels of the lower extremity – in order to find signs of thrombosis and atherosclerosis, which is an invariable factor in metabolic syndrome), the state of central venous pressure (CVP) is also evaluated – one of the main criteria that helps in the diagnosis of hypovolemic condition, which is a companion of fractures of the long bones of the lower limb. This parameter helps to adequately

compensate for blood rheology, prevent negative water balance, and also replenish BCC, taking into account the state of filtration function of the kidneys.

According to the type of fractures in the main and control groups, intra-articular fractures prevailed – 70,7% and 67,6%, respectively, extra-articular fractures in the main and control groups, therefore, amounted to 29,2% and 32,3%. Patients of the main group with high risk (n=17) were treated conservatively for cardiological, endocrinological, neurological comorbidities to optimize the somatic status. After optimization of the somatic status with a repeated assessment of the risk of possible development of postoperative complications, the patients of the main group were distributed as follows, low risk (<10%) - 10 patients (15,4%), average risk (10-30%) - 44 patients (67,7%), high risk (> 30%) - 11 patients (16,9%). Thus, the number of high-risk patients was reduced by 1,54 times ($X^2=30,2$, $p < 0,05$) due to distribution into lower-risk groups, including the low-risk group.

Discussion

The interrelation and interaction of the essential features of our method ensured the achievement of a new technological medical result in solving the assigned appointment. This allows the traumatologist to quickly assess the patient's condition through preliminary diagnosis of comorbid conditions, an objective assessment of the risks of complications. One of the most severe injuries leading to disability and having a high one-year mortality rate is a fracture of the proximal femur [3,4]. We chose this particular localization of the fracture for clarity and confirmation of the effectiveness of our nomogram.

The choice of the method of surgical intervention, whenever possible, was determined by the method of choosing the tactics of surgical treatment for fractures of the proximal femur developed by Russian colleagues [5]. The method of surgical intervention was based on the types of fracture: for intra-articular fractures - total hip arthroplasty, cannulated screws, fixation with a bunch of wires. In case of extra-articular fractures, intramedullary osteosynthesis was performed with PFN-type structures with blocking, plates for the proximal femur with angular stability. Primary total arthroplasty was performed in 25.7% of patients in the main group and 19.9% in the comparison group. Consequently, in 75.3% of the main and 79.9% of patients in the comparison group, one or another type of osteosynthesis was performed. The number of

complications in the main group was 1.3 times less than in the control group.

Thus, according to the results of our study, the effectiveness of the nomogram for predictive assessment of the risk of possible complications in patients with fractures of the proximal femur is confirmed. This method of using the nomogram allows for a multidisciplinary approach to a difficult problem. As a result, preoperative medical examination and planning should include:

- Determination of the nature, severity and degree of control of all comorbid conditions that may affect the adoption of perioperative clinical decisions and the provision of medical care;
- Optimization and treatment of all active medical pathological conditions;
- Assessment of the risk associated with anesthesia and surgery (magnitude and type);
- Informing patients and their families about possible complications and relative severe and prolonged postoperative rehabilitation.

In traumatology, the need for surgical intervention is rarely questioned, but in this case, the expected benefits of the procedure should be balanced with perioperative risks.

Conclusion

The effectiveness of the nomogram for prognostic assessment of the risk of developing possible complications in patients with fractures of the proximal femur is confirmed.

Conflict of interest: Not available.

Financing: Not available.

Authors' contribution: K.M. - conceptualization, editing; R.Y. - data processing, writing; M.S. - data collection.

References

1. Gandhi R., Razak F., Tso P., Davey J.R. et al. Metabolic syndrome and the incidence of symptomatic deep vein thrombosis following total knee arthroplasty. *Journal of Rheumatology*. 2009; 10(36): 2298–2301 <https://doi.org/10.3899/jrheum.090282>.
2. Zmistowski B., Dizdarevic I., Jacovides C.L., Radcliff K.E. et al. Patients with uncontrolled components of metabolic syndrome have increased risk of complications following total joint arthroplasty. *Journal of Arthroplasty*. 2013; 6(28): 904–907. <https://doi.org/10.1016/j.arth.2012.12.018>.
3. Abrahamsen B., Van Staa T., Ariely R., Olson M. et al. Excess mortality following hip fracture: A systematic epidemiological review. *Osteoporosis International*. 2009; 20(10): 1633–1650. <https://doi.org/10.1007/s00198-009-0920-3>.
4. Downey C., Kelly M., Quinlan J.F. Changing trends in the mortality rate at 1-year post hip fracture - a systematic review. *World Journal of Orthopaedics*. 2019; 10(3): 166–175. <https://doi.org/10.5312/wjo.v10.i3.166>.

5. Агаджанян В.В., Милуков А.Ю., Устьянцев Д.Д., Гилев Я.Х. Прогностическая модель потенциального риска развития осложнений у пациентов с переломами проксимального отдела бедренной кости // Политравма. – 2018. – №3. – С. 6-19.

Agadzhanian V.V., Miliukov A.Iu., Ust'iantsev D.D., Gilev Ia.Kh. Prognosticheskaia model' potentsial'nogo riska razvitiia oslozhenenii u patsientov s perelomami proksimal'nogo otdela bedrennoi kosti (Predictive model of the potential risk of complications in patients with fractures of the proximal femur) [in Russian]. Politravma. 2018; 3: 6-19.

Аяқтың ұзын сүйектерінің сынығы бар науқастарда зат алмасу бұзылыстары аясындағы асқынулар туындау қатерін бағалау

Якубджанов Р.Р.¹, Мадрахимов С.Б.², Каримов М.Ю.³

¹ Травматология-ортопедия және әскери дала хирургиясы кафедрасының аспиранты, Ташкент медицина академиясы, Ташкент, Өзбекстан. E-mail: ravshan.yakubdjanov@gmail.com

² Ташкент медицина академиясының Көпбейінді клиникасының травматология бөлімшесінің дәрігер-ординаторы, Ташкент, Өзбекстан. E-mail: m_sarvar91@mail.ru

³ Травматология-ортопедия және әскери дала хирургиясы кафедрасының меңгерушісі, Ташкент медицина академиясы, Ташкент, Өзбекстан. E-mail: m.karimov@mail.ru

Түйіндеме

Зерттеудің мақсаты: метаболикалық синдром фонында аяқтың ұзын сүйектерінің сынуы бар науқастарда асқыну қаупін бағалау.

Әдістері. Бір орталықты ретроспективті зерттеуде 2016-2021 жылдар ішінде Ташкент медицина академиясының Көпбейінді клиникасына жүгінген 95 науқастың (негізгі топ) жамбас сүйегінің проксимальды сүйектерінің сынықтарын емдеу нәтижелері талданды. Бақылау тобына 2014 жылдың қаңтарынан 2016 жылдың желтоқсан айына дейін емделген 102 науқас кірді. Орташа жасы $67,7 \pm 11,6$ жасты құрады. Зерттеуге қосу критерийлері: жасы 18-ден жоғары, жарақаттың ауырлығы ISS (Жарақаттанудың ауырлық көрсеткіші) шкаласы бойынша 15 балдан аз, біздің клиникада толық емделу (басқа клиникаларға ауыстырылмай), бір тәуліктен астам ауруханада болу. Қосалқы ауру санатын ASA (Американдық анестезиологтар қоғамы) бойынша анықтадық.

Нәтижелері. Сынық түрлері бойынша негізгі (70,7%) және бақылау (67,6%) топтарында буынішілік сынықтар басым болды. Негізгі және бақылау топтарында буыннан тыс сынықтар сәйкесінше 29,2% және 32,3% құрады. Тәуекел деңгейі жоғары негізгі топтағы науқастардың ($n=17$) соматикалық статусын оңтайландыру үшін оларға кардиологиялық, эндокринологиялық және неврологиялық аурулар бойынша консервативті ем жүргізді. Отадан кейінгі асқынулардың ықтимал даму қаупін қайта бағалау арқылы соматикалық мәртебені оңтайландырғаннан кейін негізгі топтағы науқастар келесідей бөлінді: тәуекел деңгейі төмен (<10%) – 10 науқас (15,4%), орташа қауіп (10-30%) – 44 науқас (67,7%), жоғары қауіп (>30%) – 11 науқас (16,9%). Осылайша, тәуекел дәрежесі төмен топтарға, соның ішінде жоғары қауіп тобына жататын науқастардың саны 1,54 есеге қысқарды ($X^2=30,2$, $p<0,05$).

Қорытынды. Осылайша, проксимальды жамбас сүйегінің сынықтары бар науқастарда ықтимал асқынулардың даму қаупін болжамды бағалау үшін номограмманың тиімділігі расталды.

Түйін сөздер: аяқтың сынуы, зат алмасу синдромы, сынықтардың асқынулары, зақымдалуларды ортопедиялық бақылау.

Оценка риска осложнений больших при переломах длинных костей нижней конечности на фоне метаболического синдрома

Якубджанов Р.Р.¹, Мадрахимов С.Б.², Каримов М.Ю.³

¹ Аспирант кафедры травматологии-ортопедии и военно-полевой хирургии, Ташкентская медицинская академия, Ташкент, Узбекистан. E-mail: ravshan.yakubdjanov@gmail.com

² Ординатор отделения травматологии, Многопрофильная клиника Ташкентской медицинской академии, Ташкент, Узбекистан. E-mail: m_sarvar91@mail.ru

³ Заведующий кафедрой травматологии-ортопедии и военно-полевой хирургии, Ташкентская медицинская академия, Ташкент, Узбекистан. E-mail: m.karimov@mail.ru

Резюме

Цель исследования: оценить риск возникновения осложнений больших при переломах длинных костей нижней конечности на фоне метаболического синдрома.

Методы. В ретроспективном одноцентровом исследовании проанализированы исходы лечения переломов проксимального отдела бедренной кости у 95 пострадавших (основная группа), обратившихся в Многопрофильную клинику Ташкентской Медицинской Академии с 2016 года по 2021 года. В группу сравнения вошли 102 пострадавших с переломами длинных

костей нижней конечности, которые прошли лечение в нашей клинике с января 2014 года по декабрь 2016 года. Средний возраст составил $67,7 \pm 11,6$ лет. Критериями включения в исследование явились: возраст более 18 лет, тяжесть травмы менее 15 баллов по шкале ISS (Injury Severity Score), полное пребывание в нашей клинике (без перевода в другие), длительность госпитализации более суток. Категорию коморбидности определяли по ASA (American Society of Anesthesiologists).

Результаты. По типу переломов в основной и контрольной группах преобладали внутрисуставные переломы – 70,7% и 67,6% соответственно, внесуставные переломы в основной и контрольной группах, следовательно, составили 29,2% и 32,3%. Пациенты основной группы с высоким риском ($n=17$), лечились консервативно по поводу кардиологической, эндокринологической, неврологической сопутствующей патологии для оптимизации соматического статуса. После оптимизации соматического статуса при повторной оценке риска возможного развития послеоперационных осложнений пациенты основной группы распределились следующим образом, низкий риск ($<10\%$) – 10 пациентов (15,4%), средний риск (10-30%) – 44 пациент (67,7%), высокий риск ($>30\%$) – 11 пациентов (16,9%). Таким образом, количество пациентов с высоким риском было снижено в 1,54 раза ($\chi^2=30,2$, $p < 0,05$) за счет распределения в группы с меньшим риском, в том числе и в группу низкого риска.

Выводы. Таким образом, подтверждается эффективность номограммы для прогностической оценки риска развития возможных осложнений у пациентов с переломами проксимального отдела бедренной кости.

Ключевые слова: переломы нижних конечностей, метаболический синдром, осложнения переломов, ортопедия контроля повреждений.