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TREATMENT OF MAXILLOFACIAL INJURIES IN PATIENTS WITH COMBINED TRAUMA

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Abstract. This article analyzes the challenges of treating maxillofacial injuries in patients with combined (polytraumatic) trauma, highlighting diagnostic and surgical features, as well as the advantages of modern treatment technologies. The study was conducted at the clinical base of the Tashkent Medical Academy between 2022 and 2024, involving 68 patients. The results showed that using mini-plate osteosynthesis and an individualized approach reduced bone healing time by 2.5 weeks, decreased infectious complications by 9.3%, and improved aesthetic outcomes by 17%. The use of PRP therapy and physiotherapy accelerated soft tissue regeneration by 1.5 times.

The article substantiates the clinical effectiveness of a multidisciplinary approach, 3D computed tomography planning, modern osteosynthesis methods, and rehabilitation techniques.

Key words: maxillofacial region, combined trauma, osteosynthesis, mini-plate, PRP therapy, 3D computed tomography planning, rehabilitation, traumatology.

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ЛЕЧЕНИЕ ПОВРЕЖДЕНИЙ ЧЕЛЮСТНО-ЛИЦЕВОЙ ОБЛАСТИ У ПАЦИЕНТОВ С СОЧЕТАННОЙ ТРАВМОЙ

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Аннотация. В данной статье проанализированы проблемы лечения повреждений челюстно-лицевой области у пациентов с сочетанными (политравматическими) травмами, их диагностические и хирургические особенности, а также преимущества современных технологий лечения. Исследование проведено на клинической базе Ташкентской медицинской академии в 2022–2024 годах на примере 68 пациентов.

Результаты показали, что при использовании остеосинтеза с помощью минипластин и индивидуального подхода сроки сращения костей сократились на 2,5 недели, частота инфекционных осложнений снизилась на 9,3 %, а эстетические результаты улучшились на 17 %. Применение PRP-терапии и физиотерапии ускорило регенерацию мягких тканей в 1,5 раза.

В статье обоснована клиническая эффективность мультидисциплинарного подхода, планирование на основе 3D компьютерной томографии, современных методов остеосинтеза и реабилитации.

Ключевые слова: челюстно-лицевая область, сочетанная травма, остеосинтез, минипластина, PRP-терапия, планирование на основе 3D компьютерной томографии, реабилитация, травматология.

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RELEVANCE

In recent years, the incidence of severe injuries resulting from road traffic accidents, industrial accidents, sports injuries, and domestic traumas has been increasing globally, particularly in the Republic of Uzbekistan [1,7,14]. According to statistics, 150-200 out of every 1,000 injury cases occur as combined or polytrauma. In 30-40% of such patients, the maxillofacial region is also affected [5,6,11].

The maxillofacial area is anatomically very complex: it comprises numerous bones, muscles, blood vessels, nerves, and soft tissues. Consequently, injuries to this region significantly impact not only aesthetic appearance but also vital functions - breathing, swallowing, chewing, speech, vision, and facial expressions [2,3,10].

Maxillofacial injuries with combined trauma are diagnostically challenging, and treatment requires a multi-stage and multidisciplinary approach. The patient's severe general condition, blood loss,

shock, respiratory insufficiency, and central nervous system dysfunction delay or complicate surgical interventions [4,6].

Today, in the treatment of such patients, alongside traditional immobilization methods, modern technologies such as osteosynthesis, microsurgery, 3D computed tomography planning, and regenerative medicine are being widely implemented. With their help, it is possible to accurately restore the anatomical state of bones, accelerate soft tissue regeneration, and ensure the patient's functional rehabilitation in a short period [5,15,16,19].

Therefore, applying comprehensive, individualized, and technological approaches in treating maxillofacial injuries in patients with combined trauma is a pressing medical issue.

PURPOSE OF THE STUDY

The aim of the study is to improve treatment effectiveness by timely detection of maxillofacial injuries in patients with combined trauma, assessment of their severity, and application of modern surgical, osteosynthesis, and rehabilitation methods [2,5].

MATERIALS AND METHODS

The study was conducted on 68 patients treated in the Adult Maxillofacial Surgery Department of Tashkent Medical Academy from 2022 to 2024 [5,6].

Methods used:

1. Clinical examination (facial symmetry, breathing, swallowing, speech).
2. Radiological diagnostics (CT, 3D reconstruction).
3. Surgical intervention (osteosynthesis, tissue repair) [3], [9].
4. Antibiotic and analgesic therapy [1].
5. Rehabilitation methods (physiotherapy, PRP therapy, speech exercises) [7,17,18].

RESULTS

The treatment algorithm was implemented in three stages:

1. Initial stage - life preservation

All patients underwent measures primarily aimed at restoring vital functions:

Airway management (intubation or tracheostomy),

Hemorrhage control,

Shock prevention (analgesia, fluid resuscitation, blood transfusion),

Clearing the oral cavity of blood and tissue debris.

At this stage, actions were taken based on the ATLS (Advanced Trauma Life Support) algorithm.

2. Surgical stage

Two approaches were used for osteosynthesis:

Traditional immobilization (dental splints, intermaxillary fixation) - 18 patients (26.5%);

(Figure 1)

Osteosynthesis using mini plates (titanium, 1.5-2.0 mm) - 42 patients (61.8%); (Figure 2)

Aesthetic principles were followed when suturing soft tissues. In cases of large defects, an autograft was applied using microsurgical techniques.

3. Rehabilitation stage

During the rehabilitation period, physiotherapy, PRP injections, and oral hygiene monitoring were carried out. Patients were recommended a special diet, articulation exercises, and work with a speech therapist.

Additionally, in 25 patients who received PRP therapy, epithelialization of soft tissues occurred 1.5 times faster [17, 18].

DISCUSSION

The obtained results indicate that an individualized approach, rather than a standard one, is necessary for treating maxillofacial injuries in patients with combined trauma. Traditional methods (splints, casts, bandages) worsen oral hygiene, restrict nutrition and speech, which increases the risk of infection [2, 3]. Therefore, osteosynthesis using mini plates is considered the most optimal method in modern medicine - it ensures anatomical restoration, significantly reduces postoperative complications, and allows the patient early functional activity [6, 12].

3D planning and navigational surgery enable the placement of bone fragments with anatomical precision. These technologies reduce operating time by 20-25% and decrease the risk of reoperation [15, 16, 19].

During the rehabilitation stage, physiotherapy, PRP, and laser therapy improve blood circulation in soft tissues and accelerate the regeneration process.

A multidisciplinary approach (maxillofacial surgeon, intensive care specialist, neurologist, anesthesiologist, physiotherapist, psychologist)

Table 1

Gender composition of patients

Gender	Number (persons)	Percentage (%)
Men	48	70.6%
Women	20	29.4%
Total	68	100%

Table 2

Causes of injury

Cause of injury	Percentage (%)
Road traffic accidents	62%
Domestic injuries	23%
Industrial accidents	15%
Total	100%

Table 3

Types of injuries in the maxillofacial region

Type of injury	Number of patients (persons)	Percentage (%)
Mandibular fracture	41	60.3%
Maxillary fracture (Le Fort I-III)	17	25%
Zygomaticoorbital complex injuries	10	14.7%
Total	68	100%

Table 4

Distribution of associated injuries with maxillofacial trauma

Associated injuries	Percentage (%)
Brain injuries	36%
Chest injuries	22%
Abdominal injuries	9%
Limb injuries	33%
Total	100%

Figure 1

Traditional Immobilization Method

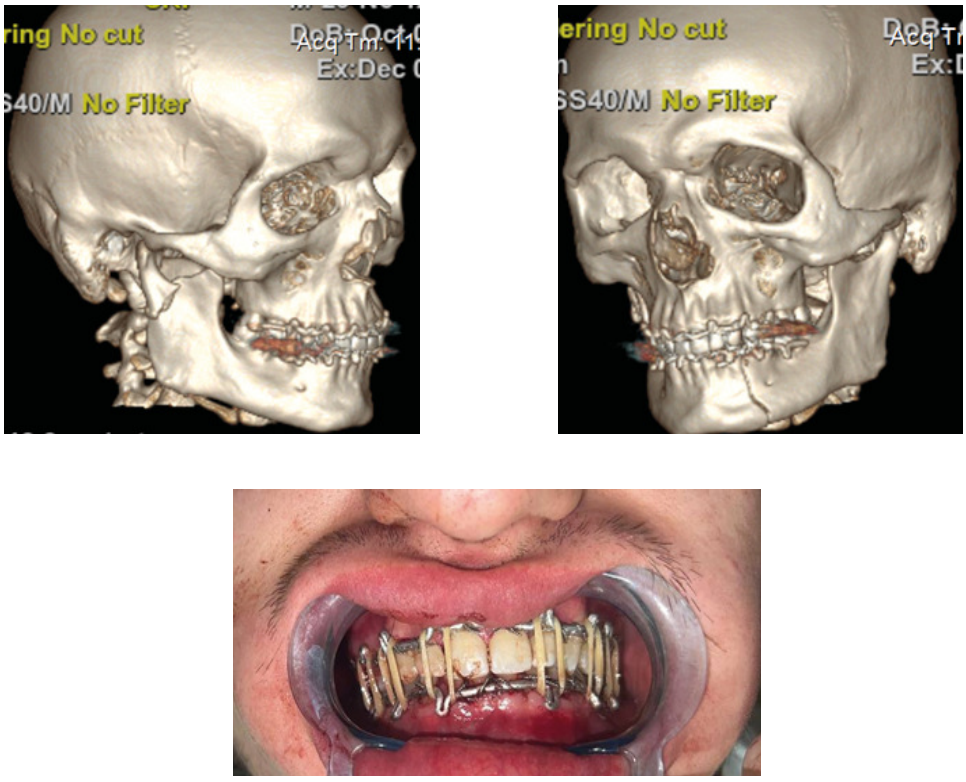
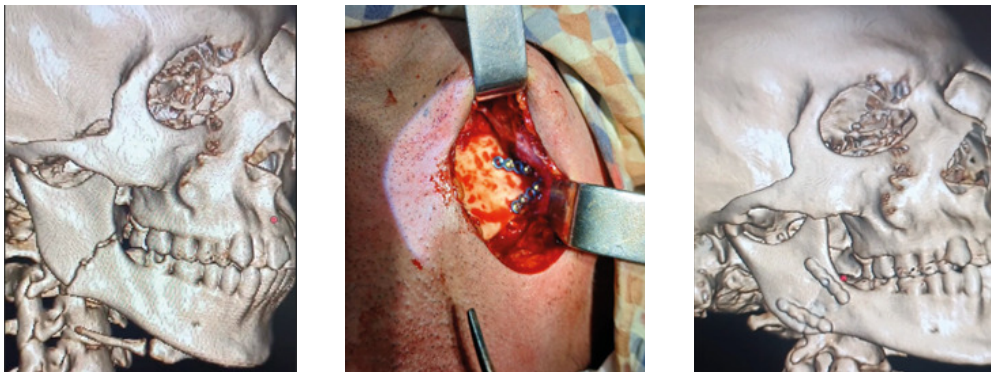


Figure 2

Method of osteosynthesis using a mini plate



Combined methods (plate + splint) - 8 patients (11.7%).

Table 5

Comparison of the clinical effectiveness of osteosynthesis using a mini plate and traditional immobilization methods

Indicator	Mini plate osteosynthesis	Traditional immobilization method	Difference
Bone healing period (weeks)	4.3 ± 0.6	6.8 ± 0.9	-2.5 weeks
Infection complications (%)	5.4	14.7	-9.3%
Aesthetic result (good)	89%	72%	+17%
Rehabilitation period (days)	18 ± 4	28 ± 6	-10 days

increases the effectiveness of treatment and accelerates the patient's social rehabilitation [7, 8, 20].

According to scientific literature (WHO, 2023), 85-90% of patients treated with a comprehensive approach have aesthetic and functional results assessed as "good" [7].

CONCLUSION

Injuries to the maxillofacial region in patients with combined trauma are often life-threatening and require early diagnosis and a multi-stage approach. Osteosynthesis using mini plates is the most effective method that ensures anatomical restoration, infection control, and a short rehabilitation period.

Planning technologies and individual plate development based on 3D computed tomography increase operational precision. PRP therapy and physiotherapeutic measures contribute to faster regeneration of soft tissues.

The involvement of a multidisciplinary medical team (surgeon, anesthesiologist, physiotherapist, psychologist) enables effective rehabilitation of patients with combined trauma.

CONFLICT OF INTERESTS

The authors declare the absence of obvious and potential conflicts of interest related to the publication of this article.

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AVAILABILITY OF DATA AND MATERIALS

All data generated or analysed during this study are included in this published article.

AUTHORS' CONTRIBUTIONS

All authors contributed to the design and interpretation of the study and to further drafts. All authors read and approved the final manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

All applicable international, national, and/or institutional guidelines for the care and use of animals were followed.

CONSENT FOR PUBLICATION

Not applicable.

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КОНФЛИКТ ИНТЕРЕСОВ

Авторы заявляют, что данная работа, её тема, предмет и содержание не затрагивают конкурирующих интересов.

ИСТОЧНИКИ ФИНАНСИРОВАНИЯ

Авторы заявляют об отсутствии финансирования при проведении исследования.

ДОСТУПНОСТЬ ДАННЫХ И МАТЕРИАЛОВ

Все данные, полученные или проанализированные в ходе этого исследования, включены в настоящую опубликованную статью.

ВКЛАД ОТДЕЛЬНЫХ АВТОРОВ

Все авторы внесли свой вклад в подготовку исследования и толкование его результатов, а также в подготовку последующих редакций. Все авторы прочитали и одобрили итоговый вариант рукописи.

ЭТИЧЕСКОЕ ОДОБРЕНИЕ И СОГЛАСИЕ НА УЧАСТИЕ

Были соблюдены все применимые международные, национальные и/или институциональные руководящие принципы по уходу за животными и их использованию.

СОГЛАСИЕ НА ПУБЛИКАЦИЮ

Не применимо.

ПРИМЕЧАНИЕ ИЗДАТЕЛЯ

Журнал *"Евразийский журнал оториноларингологии - хирургии головы и шеи"* сохраняет нейтралитет в отношении юрисдикционных претензий по опубликованным картам и указаниям институциональной принадлежности.

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