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BIOLOGICAL FIXATION FRACTURE AND ITS PERSPECTIVE

Introduction

In the management of fracture internal fixation can be best way for it repair. However even the strongly advanced implant may useless if it is not accepted biologically by the body. The biological fixation [1] strives to stimulate the alliance between available implant technology and the biological repairing and healing of the bone. It focuses on a stronger and stabled reconstruction allowing for the previous weight bearing and function. Thus, biological fixation achieves this through number of methods including prevention of soft tissue trauma, implant design changes with subsequent reduction of vascular impairment and providing mechanical environment for fracture repair and it's healing to proceed. The concept of biological fracture fixation encircles a reduction in soft-tissue trauma during the surgery, often in percutaneous application of plates. This is united with the implantation of reduced amounts of hardware. Thus, the wanted result is a fracture that repairs through indirect bone union with the formation of callus. The end result is a fracture that heals faster and is stronger, at least in the healing phase. This is will further increase the rehabilitation process after the post operative care.

Goal

This is a review article which shows that the biological fixation fracture will restore the fractured bone with full integrity, stability and their function in comparison to other possible methods.

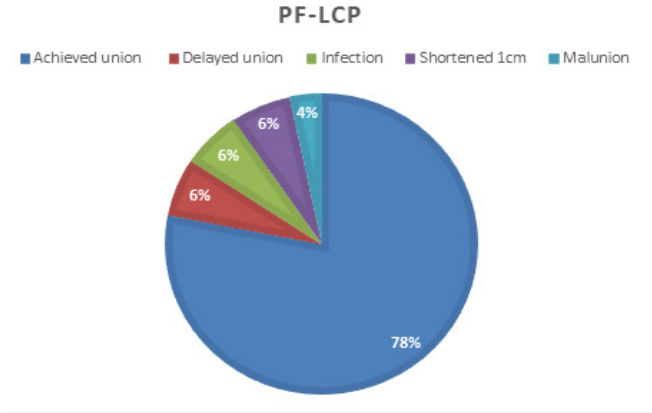
Material and methods of research

This article is made after revision of various collections of other articles in the topic of biological internal fixation in the department of trauma and orthopaedics.

The results of the research and their discussion

The principles of Biological Fixation [2] may be summarized as: Repositioning and realigning by manipulation at a distance to the fracture site, preserving soft tissue attachments, leaving comminuted fragments out of the mechanical construct while preserving their blood supply, using low elastic modulus, biocompatible material, decreasing contact between the bone and the implant and limiting operative exposure when possible. The degree of stability achieved has a determining effect upon the amount of the load borne by the implant used for fixation. And with the development of key-hole & minimally invasive surgery, arthroscopically assisted fracture reduction, reconstruction of articular surface & fixation is very much in trend. The AO principles, techniques and implants have changed considerably over the time. There is a shift of importance from mechanical to biological aspect of internal fixation with great significance being placed on the preservation of blood supply to the bones & soft tissues. Less Invasive Stabilisation System (LISS) and Minimally Invasive Percutaneous Plate Osteosynthesis (MIPPO) represents a new generation of plates and principles, as an internal fixator, minimising any surgical insult to the bone and approach related soft tissue damage. Similarly, a lot of developments for the easy and safe technique of closed nailing and interlocking of femur, tibia and other bones. Use of ultrasound for control of passage of guide wire by closed technique is one of the latest developments. Ultrasound and Doppler studies are used for assessing the fracture healing. The technique studies the morphology of callus and neo-vascularisation to

predict the progress of fracture healing. The test is non-invasive, cheap and easily accessible. Minimally invasive surgery and computer-aided techniques helping in the future developments in the fracture management. In the study in New Delhi et al [3], 32 patients of average age with sub trochanteric fracture of femur surgically treated with Biological internal fixation using PF-LCP tool. This given pie chart shows the result of fracture success rate using the method of biological internal fixation (Picture 1).



Picture 1 – Fracture success rate using the method of biological internal fixation

In the study of Agus et al [4], 14 children with a closed comminuted femur shaft fracture were surgically treated by biologic internal fixation using a bridging plate. After a follow-up period of 4 years, all patients were satisfied with the clinical outcome. It was concluded that biologic internal fixation by bridge plating was an effective surgical treatment method for closed comminuted fractures of the proximal and distal thirds of the femur shaft in children. In 1994, Baumgaertel and Gotzen showed that in classic fixation 80% of the arteries were damaged, but in biological fixation these vessels remain intact. In the study of Tahmasebi et al in which 15 patients with closed comminuted fractures of the femur or tibia were treated through biological fixation, the mean time of union was 6.1 weeks in femur fractures and 8.3 weeks for Tibial fractures (only 3 patients). There was no malunion, non-union or complication, and they found this method to be useful. Finally, Sarafan et al showed that biological fixation is an appropriate method for closed comminuted fractures of long bones, yet is not suggested in open fractures due to the high rate of infection. In 1996 a study from 1980 to1989 conducted in which 139 patients using DCP achieved 92% of success and in 2000, article study of 51 patient treated with LC-DCP reached 94% success rate. In 2006, an article which analysed 19 studies shows that out of 287 patient around 230 with comminuted fractures were renuioned with 98.4% success rate and in 2020, a study from 2010 to 2018 on 118 patients treated with IM nailing, had been 90% successful. In 2023, a study from 2017 to 2021 with 135 old patients' fragility pelvis fracture the success rate in minimally invasive surgery than conservative treatment (Picture 2).

Picture 2 – Timeline of successful growth of biological internal fixation method

Conclusion

Despite the knowledge that soft tissues should be preserved during open reduction of fractures, surgeons traditionally have sought to achieve maximum stability regardless of the impact it might have on the soft tissues.So, advantages in the biological internal fixation are limited contact with bone and implant, limited exposure and utmost respect to soft injury. This method which can be used in the treatment of comminuted fractures of long bones in situations in which "locked intramedullary nailing" is technically impossible or contraindicated. Although it had some complications and some failure, this method achieved an increased success rate without further deteriorating the healing of the fracture. And this also tend to recover the patient repair as possible as in their original state. Thus, the biological plating is a perspective cost beneficial and a technically easy procedure.

LITERATURE

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АЛКОГОЛЬНЫЙ ДЕЛИРИЙ (КЛИНИЧЕСКИЙ СЛУЧАЙ)

Введение

Алкогольный делирий (АД) (или «белая горячка») впервые описан английским врачом Sutton в 1813 году. Он указывал, что характерной чертой алкогольного делирия является формирование его не на фоне опьянения, а на вторые-пятые сутки после резкой отмены привычного приема алкоголя.

Цель

Провести литературный обзор русско- и англоязычных публикаций на тему АД, изучить клинический случай АД у пациентки в отделении анестезиологии, реанимации и интенсивной терапии (ОАРИТ) учреждения здравоохранения «Гомельская областная клиническая психиатрическая больница».

Материал и методы исследования

Анализ научных публикаций, размещенных на русско- и англоязычных ресурсах за период 2019–2024 годы, рассмотрение клинического случая АД в учреждении здравоохранения.

Результаты исследования и их обсуждение

Алкогольная зависимость – одна из самых частых аддикций современности. По оценкам Всемирной организации здравоохранения, почти 80 млн человек страдают расстройствами, связанными с употреблением алкоголя, что составляет 14% населения