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Review Article

Stem cells in the treatment of surgical wounds

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ABSTRACT

One surgical method per year for every 22 people is developed. Stem cells are those that are known to have an important and unique potential for renewal. They have the functionality to make a difference in many different cell types throughout the early stages of life and growth. Skin is the largest organ in the body and has a variety of functionalities. Compartments of the dermis, epidermis and hair follicles house stem cells important for homeostasis and regeneration of the dermis. These stem cells contribute to wound repair, which results in total tissue replacement and damaged tissue function. The authors agree on the theoretical role of stem cells in the treatment of surgical wounds. Treatment must be individualized, and variables such as adverse effects must be taken into account, however, it seems to be a promising therapeutic.

Keywords: Stem cells, Surgical wound, Therapy

INTRODUCTION

Annually, it is considered that 4,511 operations are performed for every 100,000 habitants, that is, 1 surgical method per year for every 22 people. Internationally, surgical wounds are most commonly treated in acute care settings and are associated with a wide range of complications, including bleeding and dehiscence.[1,2] The act of trying to wounds is an art, as it is necessary to consider numerous concepts inherent to the human being, in addition to the biological and molecular ones, use them as tools and, in the end, avoid infections, recover tissue functionality and its barrier effects and, in the end, achieve aesthetically satisfactory results. And is that, despite the exponential advances that we have had in terms of wound procedures, the complications or the final result of these have the possibility of leaving much to be desired, even under strict protocols of asepsis and antisepsis, as it is in the operating room. for the reasons explained in the previous lines that this review work intends to establish the role of stem cells in the surgical wound procedure. We searched PUBMED for articles that talk about stem cells and surgical wounds, to analyze the information contained in them and synthesize it in the present text.

THEORETICAL FRAMEWORK

Stem cells are those that are known to have an important and unique potential for renewal. They have the functionality to make a difference in many different cell types throughout the early stages of life and growth. Both of the defining properties of a stem cell are perpetual self-renewal and the functionality to make a difference to a specialized type 2 adult cell. The main focus of this article will be stem cells that fit into one of these 4 primary categories: embryonic, pluripotent, mesenchymal and induced stem cells. Embryonic stem cells are immortal and totipotent, that is, these life units have the possibility of developing a complete person if they receive nutrients.[3] Pluripotent stem cells have the function of self-renewal and offer space for each of the

cells.[4] Multipotent stem cells (mesenchymal) have the function of making a difference to all cell types of a special lineage.[5] Human-induced pluripotent stem cells (hiPSC) are somatic cells reprogrammed to a state with greater potential for self-renewal and differentiation.[6] Stem cells are undifferentiated cells in multicellular organisms, which have the function of marking the difference in several lineages. Stem cells have unlimited replacement potential, as there is a need to fix the tissues and organs of our human body.[7]

Skin is the largest organ in the body and has a variety of functionalities. Compartments of the dermis, epidermis and hair follicles house stem cells important for homeostasis and regeneration of the dermis. These stem cells contribute to wound repair, which results in total tissue replacement and damaged tissue function. Faulty wound healing processes constantly lead to wounds that do not heal. Chronic wounds are caused by stem cell depletion and a number of other cellular and molecular mechanisms, many of which are still poorly understood. Recent therapies for chronic wounds are limited and mainly do not meet the expectations of patients, so the search to develop superior therapeutic tactics is continuous, which launches stem cell therapies as profound candidates, as being applied in the body their effects help to activate the regenerative. potential of resident stem cells or even through tissue engineering. The use of stem cell therapies to treat these wounds results in improved cell signaling, release of augmenting components and cytokines, neo-vessel formation, and immunomodulatory characteristics. Mesenchymal stem cells secrete augmentation components and interleukins: ANGPT2, BMP2, BMP3, BMP4, BMP7, CCL2, CCL3, CSF2, CSF3, CXCL12, EGF, FGF2, FGF4, FLT3, FLT3LG, GDF5, HGF, IFNG, IGF1, IGF2, IL17A, IL1A, IL1B, IL3, IL4, IL6, KITLG, LIF, MSTN, PDGFA, PDGFB, TGFB1, TGFB2, TGFB3, TNF, VEGFA, VEGFC, which aid in the proliferation of dermal fibroblasts through direct cell-to-cell contact. activation throughout the proliferation phase.[7,8]

Mesenchymal stem cells derived from adipose tissue have demonstrated clinical efficacy in the treatment of chronic wounds secondary to severe radiation injuries, chronic fistulas and ulcerations, including venous leg ulcers. Mesenchymal stem cells derived from adipose tissue accelerate wound healing and have antioxidant effects under different conditions; These are mainly mediated by the activation of dermal fibroblasts and keratinocytes through the paracrine mechanism.[9,10]

The secretion of anti-apoptotic and anti-inflammatory angiogenic components from adipose tissue-derived mesenchymal stem cells is increased by exposure to stimuli such as hypoxia, TNF-α and lipopolysaccharides, which potentiate the regenerative function of adipose tissue-derived mesenchymal stem cells.[10] Mesenchymal stem cells (MSCs) have direct antimicrobial characteristics that remain mediated by the secretion of the antimicrobial peptide LL-37.[8,9,11-13]

The impact of this product is promising, as far as individualized treatment is concerned, the projections indicate an increasing decrease in morbidity and mortality associated with surgical wounds and their repair, likewise, the aesthetic results are more favourable for patients, having a direct psychological impact on their self-perception, improving their quality of life compared to traditional methods. The authors agree on the theoretical role of stem cells in the treatment of surgical wounds.[4-7] Likewise, a giant advance has been made compared to past years in terms of our understanding of the use of stem cells, the authors agree on this point and have been able to elucidate the molecular factors involved in this matter and point to promising results in the future.[7-13] Research on adipose-derived stem cells focuses on promoting the survival of transplanted fat, improving local soft tissue defects such as breast reconstruction and facial shaping. They assist fat transplantation to reduce wrinkles, improve skin ulcers, and diabetic feet. Cell-assisted lipotransfer (CAL) was proposed by Matsumoto, Sato, and Gonda to enrich aspirated fat with the SVF obtained after enzymatic isolation and improve the long-term volume retention, significantly improving the survival rate of transplanted fat with less fat resorption and a marked decrease in the adverse effects of lipoinjection such as cyst formation and fibrosis.[14] Chai et al found that applying stem cells in the cell sheet format enhanced cellular survival within wound tissue during the healing process.[15] They also demonstrated that ASC sheets can promote wound healing and ameliorate neoskin quality with a model of cutaneous wounds in nude mice, thus representing an effective topical wound treatment modality.

CONCLUSION

Treatment must be individualized, and variables such as adverse effects must be taken into account, however, it seems to be a promising therapeutic.

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