Regenerative Medicine in Aesthetic Surgery: Hope or Hype?

Regenerative medicine is the new buzzword in all branches of medicine and is creating a lot of excitement with regard to its potential uses. It is more so in aesthetic surgery where the quest is always on for newer ways to rejuvenate an ageing population. Regenerative medicine can be defined as 'an interdisciplinary field of research and clinical applications focused on the repair, replacement or regeneration of cells, tissues or organs to restore impaired function resulting from any cause, including congenital defects, disease, trauma and ageing'.[1] Simply put, it includes all means to regenerate tissues. It can include cell therapies, tissue engineering, gene therapy and biomedical engineering techniques, as well as more traditional treatments involving pharmaceuticals, biologics and devices. Among all these, stem cell therapy and platelet-rich plasma (PRP) have captured the imagination of physicians and patients alike, and there is a plethora of literature on these two therapies. How much is a myth and what is the reality is a difficult question to answer as there are hardly an standardized trials, and most articles are case series or extrapolations from bench to the bedside.

PRP is an autologous therapy based on the release of growth factors from concentrated platelets derived from the patient's own blood. Platelets play an important role in the regenerative process during wound healing by releasing a number of growth factors on activation. They contain three large storage compartments, alpha-granules, dense granules and lysosomes.[2] All of these secretory granules contain various growth factors, cell adhesion molecules, activation molecules, proteins for coagulation, cytokines, integrins and others, with most of these being localized in the alpha-granules. PRP and its various forms such as platelet rich fibrin and platelet gel are being used in many branches of medicine including aesthetics, plastic surgery, orthopaedic surgery, dentistry, trauma and wound healing, ocular surgery, gastroenterology etc. as part of regenerative medicine. However, standardized protocols for preparation and application are yet to be established, and the review article in this issue reviews the various protocols of preparation of PRP. It gives an overview of the various methods with the authors' perspective based on their experience.[3] A recent report takes a step in that direction by quantifying growth factors and cytokines by various methodologies in order to optimize therapy.[4] In aesthetic surgery, PRP is being used for rejuvenation of the skin, wrinkles, acne scars and regrowth of hair. This issue also carries articles on the use of PRP for androgenetic alopecia,[5] atrophic acne scars[6] and chronic leg ulcer.[7] PRP is also being used in combination with adipocyte stem cells derived from autologous fat for soft tissue augmentation.[8] A major advantage of autologous PRP in the clinical setting is that it has no adverse effects to date.

Stem cell therapy is also being widely touted as a magic bullet for various clinical applications. A stem cell can be defined as a cell that is 'capable of renewing tissue for the lifetime of an organism'[9] Stem cells in the epidermis and the pilosebaceous unit are being studied extensively.[10] Recent studies indicate that multiple discrete stem cell populations with restricted lineage potential under homeostatic conditions maintain the specific compartments in the epidermis. However, these can interchange during injury to regenerate the epidermis.[11] The clinical use of autologous stem cells is also generating a lot of interest in aesthetic surgery. Adipose-derived stem cells (ADSCs) from lipoaspirate,[12] hair follicle and melanocytes stem cells present in the bulge region of the hair follicle[13,14] and interfollicular epidermal stem cells are being increasingly used in cutaneous and aesthetic surgery. ADSCs are being used in the treatment of wrinkles touted as 'stem cell face lift'[15] and for soft tissue augmentation following ageing and atrophic acne scars,[16] whereas melanocyte stem cells are being used for the treatment of vitiligo.[17]

The bottom line is that though there is scientific evidence on the positive role of PRP and stem cells in tissue regeneration and wound healing, further research is required to establish standardized protocols for clinical use. These techniques can have wide applications in cutaneous and aesthetic surgery in the years to come.

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