Faculty of Medicine
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Results of Patch Augmentation for Massive or Irreparable Rotator Cuff Tears: A Systematic Review

Essay

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ
﴿وَعلَّمَكَ مَا لَمْ تكُنْ تعْلَم
وكَانَ فَضْلُ اللهِ عَلَيْكَ عَظِيماً﴾
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Abbreviation	Full term

ADM…….Acellular dermal matrix……..……
AHD……..Acromiohumeral distance……...…..……
ASES…….American Shoulder and Elbow Surgeon……...….
CHL……..Coracohumeral ligament……..…….
CSA……...Critical shoulder angle……...……
CI……..…Confidence interval…….
CT…….Computed Tomography…….……...….
ECM……..Extra cellular matrix……..…….
HDL.....High density lipoprotein.....
IL.....Interleukin.....
IS……...Infraspinatus……
JNK.....c-Jun N-terminal protein kinase.....
LDL.....Low density Lipoprotein.....
MCS……Mental component summary……..
PCS…….Physical component summary……
MMP-1……..Matrix metalloproteinase-1……...……..
MRI.....Magnetic Resonance Imaging.....
PLLA…….Poly-l-lactic acid……..……....……..
QuickDASH..Quick Disabilities of the Arm, Shoulder and Hand
RCT.....Rotator cuff tear.....
RI…… Rotator interval……...
ROM.....Range of motion.....

ROS……Reactive oxygen species…….…..

SANE…….Single Assessment Numeric Evaluation…...……

Sbs……..Subscapularis…….

SF-12……..Short Form…….…….

SIS.....Small intestine submucosa.....

SLAP.....Superior labrum anterior and posterior…….

SS……Supraspinatus…….……

U/S……..Ultra sound……..……

UCLA…….University of California at Los Angeles…….

VAS……...….Visual Analog Scale……..……..

Vs.....Versus.....

WORC……...Western Ontario Rotator Cuff……..…….…..

Abstract

The repair of massive rotator cuff tears is very challenging and technically demanding. This occurs because of the high incidence of re-tears following primary repair. There are several treatment options and patch augmentation is considered one of them. We report in this systematic review the results of massive cuff repair using different types of commercially available patches.

Keywords: rotator cuff augmentation- rotator cuff scaffolds- massive rotator cuff repair- massive rotator cuff grafts.

Aim of the Work

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The aim of the work is to perform a systematic review of the literature regarding patch augmentation as an option for management of massive rotator cuff tears. We will shed the light on the results of using the commercially available types of patches.

Introduction

Introduction

Rotator cuff tears in general have always been a challenging and disabling problem among the elderly, athletes and active individuals (1).

It must be noted, however, that massive irreparable rotator cuff tears in particular represent nowadays even a greater challenge to most orthopaedic surgeons (2). They have been troublesome entities to treat, especially in younger patients because of the development of tendon retraction with inelasticity, muscle atrophy and fatty infiltration, all of which contribute to the higher failure rates of tendon repair (3, 4).

In general, none of the available treatment options proved to be complication-free. Many surgical techniques were proposed and aimed at decreasing pain and restoring overhead function as tendon transfers, glenohumeral joint fusion and reverse total shoulder arthroplasty (5, 6). Unfortunately the outcomes were found to be unsatisfactory in a considerable proportion of patients following these procedures. Besides, some of them were not ideal for younger patients (7).

Yet with a deeper understanding of the pathoanatomy of rotator cuff tears, which has dramatically improved over the years, newer treatment strategies have been proposed. One such strategy introduced during the last

decade is the concept of mechanically augmenting a rotator cuff repair which has emerged as a fundamental tool in the treatment of large or complex tears (8). Research has led to the development of a number of natural and synthetic biomaterials known as scaffolds that can be easily integrated into the host tissue to enhance the biological potential of tendons to heal (9). These in turn are derived from mammalian extracellular matrices (ECMs), synthetic polymers or a combination of both. On one hand, many ECMs have been used in the market as patches to augment and reinforce soft tissue repair during surgeries (10). These products include collagen-rich ECMs such as the commercially available small intestinal submucosal scaffolds (CuffPatch™, Restore®) and dermal scaffolds (TissueMend™, Zimmer®, GraftJacket®) (9). These tissue-engineered materials can be in the form of allografts or xenografts and they are the most commonly used sources for tendon augmentation as they overcome the limited availability and donor site complications that tend to occur with the use of autograft tissue (11).

It is postulated that these materials produce a certain degree of load sharing of forces across the site of tendon repair, consequently diminishing the possibility of tendon re-tear (10). It was also found that tendon augmentation using the well-defined three-dimensional structure of scaffolds can provide a chemically and

structurally constructive environment for host tissues and at the same time facilitate its quick interaction with the host tissue to induce new tissue formation (11).

On the other hand, synthetic scaffolds have a limited impact on the biology of healing; however, their capacity to maintain mechanical properties over time is used to mechanically stabilize the repaired tissue until actual host tissue healing has occurred (12).