

Scientific research project on experimental animals models

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Conflicts of meniscal healing

The meniscus is it not amenable to healing in the zone of the meniscal region which is more prone to be affected by either traumatic or degenerative lesions.¹⁻⁵ due to its inherited anatomy and physiology.^{6,7} This zone (White-White) does not have the necessary vascularity.⁸ for optimal healing process. Meniscectomy.^{9,10} either partial or total is of inferior long term results in what concern the risk of late degenerative changes.¹¹ Meniscectomy has a, heavy burden, biomechanical alterations.¹² which represents a real obstacle to obtain good results during the work on the series of patient with Meniscectomy.¹³

In spite of the acceptable result in the short term, (poorer).¹⁴ results have been seen after arthroscopic partial Meniscectomy in patients with significant degenerative joint disease. The long term (17 to 22 years) symptoms and functional limitations after meniscectomy have been stated.¹⁵

The midterm (5years) results of the repairs are usually (particularly).¹⁶ poor for atraumatic meniscal lesion. It's found that meniscal suturing gives good long term (13 years) clinical results.¹⁷ Some literatures showed long term, (13years).¹⁸ and (14years).¹⁹ non advantageous for both meniscal suture and Meniscectomy.

These results was attributed to the subclinical arthritic affection of the meniscus or to the Malfunction of sutured meniscus compared to normal one under in vivo conditions. Though some results are devastating and startling, more recent literatures stated that (Arthroscopically assisted early suturing of the injured menisci in the well-perfused zone (red-red, red-white) assures beneficial possibilities for tissue healing and enables restoration of the correct bio-mechanics of the knee joint).²⁰

Many suggestions have been made.²¹⁻²³ to improve the results. From theoretical point of view, the proposition of bringing the vascularity to the part or tissue on need by applying the principals of the micro vascular surgery .²⁴ looks attractive.

Rarely mentioned, not yet well explored.²⁵ suggestions is the arthroscopic mobilization of red-red zone meniscus flap.²⁰ The arthroscopic mobilization of the synovial membrane alone, though theoretically and technically feasible due to synovium elasticity, its efficacy is not well evident if we consider unexplained discontinuity and rarity of the old literatures in this regard?²⁶⁻²⁸

Some new literature (animal experience) noted the negative impact of the synovial fluid changes on cartilage after complete meniscectomy.²⁹ These results could be explained in the light the of different behavior (negative and positive) of the different hyaluronic acid molecules secreted by the synovium.

Importance of the Synovium in the Physiological Meniscal Healing

The synovial membrane, either one layer or both intimal and Sub-intimal layers.³⁰ behave in different ways.³¹ with the direct local pressure.^{7,25} There is rich vascular content of the synovial membrane in the (vascular pelotons). The sub intimal layer (Sub intima) of the synovium augments the vascular permeability.

The synovial membrane plays a role in the transport of the growth factors in the newly formed tissue favoring the healing process. The synovial membrane, particularly the intimal cells, secretes and absorbs the synovial fluid as a reflex to the augmentation of the intra-articular pressure.³²

The synovial fluid is produced in small quantities in the physiological stat, so unloading of the knee may reduce the production of the synovial fluid and vice versa. Hyaluronic acid has chondro-protector effects but it's found (in the laboratory) that the hyaluronic acid with molecular weight superior to 500 kDa modulate inhibition of the inflammatory response.

There is physiological capacity of the synovial membrane to augment the production of Fibroblasts. There is a capacity of the synovial membrane to stimulate the formation of the granulation tissue of the menisci. There is a capacity of the synovial membrane to improve the elasticity of the menisci by its ability of retaining water.

To Bring the Essential Elements and Vascularity for the Physiological Healing Process of the White-White Zone Meniscal/Lesions

A flap of red-red zone meniscus with its synovial membrane can be mobilized toward the white-white zone meniscal tear or lesion. Using animal models.³³ we can test this hypothesis.

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