

Biomechanical Study of Brachial Artery Remodeling with Aging using Fluid Solid Interaction Method

H. Niroomand Oscuii¹, F. Ghalichi², M. Tafazzoli Shadpour³

¹ Assistant Professor, Biomechanics department, Mechanical Engineering School, Sahand University of Technology, Tabriz, Iran

² Associate Professor, Biomechanics department, Mechanical Engineering School, Sahand University of Technology, Tabriz, Iran, fghalichi@sut.ac.ir

³ Assistant Professor, Biomedical Engineering School, Amirkabir University of Technology, Tehran, Iran, tafazoli@aut.ac.ir

Abstract

In this paper, we studied the effect of mechanical loading on remodeling process with aging in muscular arteries. Based on the gathered experimental data, the brachial artery was selected for simulation. In this simulation, pulsatile pressure and flow waves were considered as boundary conditions to study the effect of circumferential stress and wall shear stress on the remodeling process. FSI based transient numerical simulation was used to solve the fluid and solid equations. The results of three remodeling schemes showed that inward eutrophic scheme is an optimum algorithm for brachial artery remodeling with aging. Such remodeling scheme causes the most optimized outcome to keep circumferential stress with minimal alteration.

Keywords: Brachial artery, Circumferential stress, Wall shear stress, Remodeling, Fluid- solid interaction

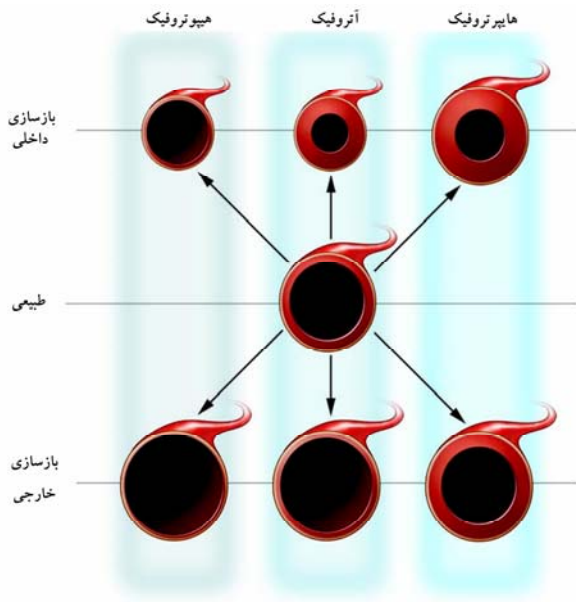
* Corresponding author

Address: Hanieh Niroomand Oscuii, Biomechanics department, Mechanical Engineering School, Sahand University of Technology, Tabriz, Iran

Tel: +98 412 3459041

Fax: +98 412 3444309

E-mail: niroomand@sut.ac.ir



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¹ Atrophy
⁵ Hypotrophic
⁹ Outward
¹³ Femoral artery

² Endothelial
⁶ Eutrophic
¹⁰ Atherosclerosis
¹⁴ Radial artery

³ Nitric Oxide (NO)
⁷ Hypertrophic
¹¹ Intima
¹⁵ Brachial artery

⁴ Remodeling
⁸ Inward
¹² Media
¹⁶ Proximal aorta

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¹⁷ Kallikrein-kinin
²¹ Fluid Solid Interaction

¹⁸ Vasodilator

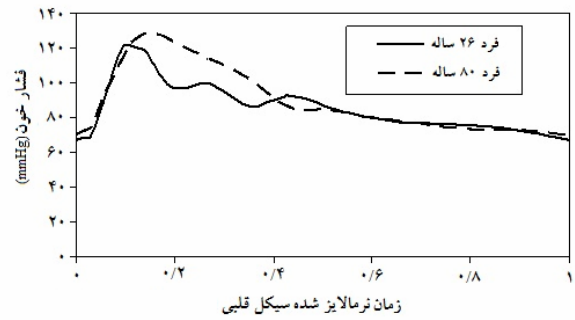
¹⁹ Carotid

²⁰ Kallikrein MRNA

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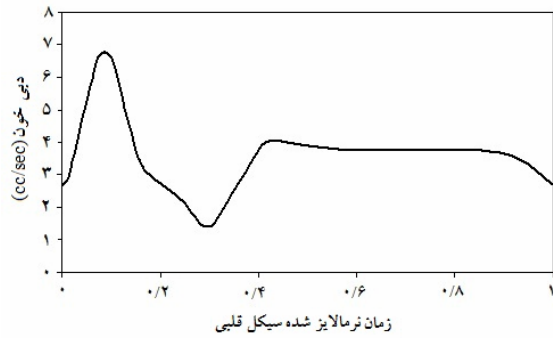
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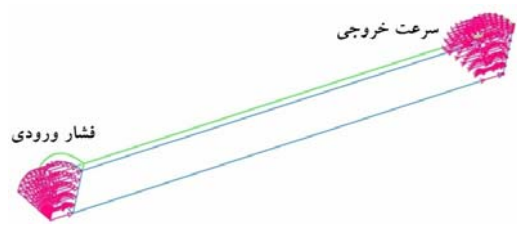
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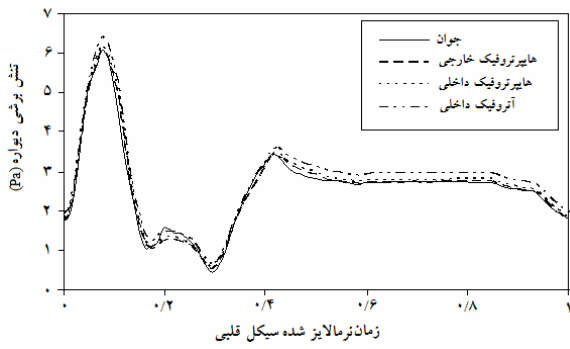
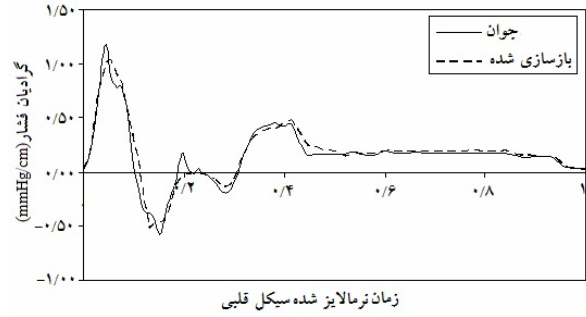
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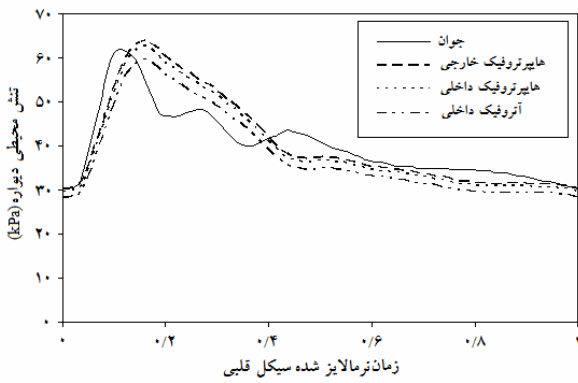


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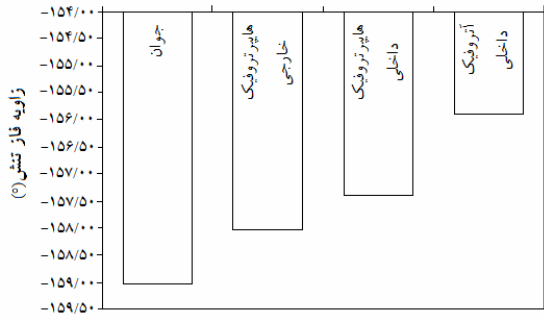


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