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Topographical and histological evaluation of the iliolumbar veins in a South African population: A cadaveric study.

by

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A Dissertation submitted to the Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, in fulfilment of the requirements for the degree of Master of Science in Medicine.

Johannesburg

23rd July 2021

DECLARATION

I, Arthur Tsalani Manjatika (Student number: 2228141), declare that this Dissertation is my own, unaided work. It is being submitted for the Degree of Master of Science in Medicine at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at any other University.



(Signature of candidate)

On the 23rd of July 2021 in Johannesburg, South Africa.

ABSTRACT

Introduction

Safe operative techniques to the anterior and lateral lumbar spine and the posterior abdominal wall structures require an excellent working knowledge of this region's anatomy and anatomical variations. The iliolumbar veins (ILVs) and their high frequency of variations are crucial to lumbosacral spine and pelvic region surgical interventions since their damage during surgery may result in significant hemorrhage. Therefore, the purpose of the current study was to describe the topographic anatomy and characterize the anatomical variations of the ILVs and determine the tissue composition of the ILVs in South African White cadavers.

Materials and Methods

A total of 89 adult cadavers of the White South African population were accessed from the School of Anatomical Sciences at the University of the Witwatersrand and comprised the sample size of this study. The specimens used were of known sex and age. The dissection of the ILVs was done following the standard methods. The course, morphometrics, drainage patterns, location, and relations to the lumbar plexus of the ILVs were studied and recorded. The descriptive data were analyzed using SPSS® version 23 (IBM®). Histograms and Shapiro Wilk tests were used to test for the normality of data. The comparisons for mean values were obtained using two sample student t tests. A total of 19 ILVs were harvested, and their proximal and distal sections were processed for Hematoxylin and Eosin, Masson's trichrome and Verhoeff's histological stains. The stained sections were viewed under a light microscope, and their tissue composition was determined. Specifically, the total percentage of elastin and collagen available in the ILVs and their ratio was determined using the Image J software (Fiji 2012 version).

Results

Iliolumbar veins (ILVs) were observed in 100% of the study population. The proximal iliolumbar vein (PILV) was the most prevalent, with a frequency of 93.5% of the observed cases. The maximum number of four trunks of the ILVs was observed on the left side, and this was higher in females than males (p=.021). On the left side, ILVs drained primarily into the external iliac vein (EIV) while on the right side, they drained into the internal iliac vein (IIV) (p=.001). The majority (64.8%) of ILVs had two tributaries. On the left side, ascending lumbar

veins (ALVs) drained the space between the 4th and 5th lumbar vertebra (L4/L5) (p=.008) and predominantly in males (p=.014). Close to half (45.8%) of ILVs anastomosed with each other. The common trunk of ALV and ILVs (ALV-ILV) anastomosed with PILVs more on the right side of the body (p=.011). On the left side, the ILVs terminated into the iliac vessels laterally (p=.001), while on the right side, the ILVs terminated into the iliac vessels posteriorly (p=.001). A total of 35.5% of the ILVs were in direct relation to the L4 spinal nerve root of the lumbosacral trunk. A large proportion (42.2%) of ILVs were found at the S1 vertebral level. A total of 28% of the ALVs were located at less than 30mm from the inferior vena cava (IVC), most of which occurred in females (p=.048) and on the right side of the body. On the left side, the PILVs had higher elastic fibres than the right side (p=.030). In the ILVs, the elastic to collagen fibre Area Ratio was 1: 9.

Conclusions

The current study showed that the patterns of the ILVs vary within the White South African population group similar to reports from other studied population groups in the world. Structurally, ILVs have more collagen fibres than elastic fibres in their walls, and this poses a risk for avulsion when retracted during surgery. Therefore, it is essential to identify the variant patterns of the ILVs before surgical operations to minimize bleeding and blood loss during surgery of the lumbar and sacral regions.

Ethical Clearance

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12 April 2021

To whom it may concern

Ethics waiver: W-CBP-210401-01

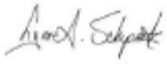
It is hereby confirmed that the ethics waiver W-CBP-210401-01 (attached) has been granted to Mr. Arthur Tsalani Manjatika, Student Number 2228141, for his research entitled: Topographical and histological evaluation of the iliolumbar veins in a South African population: A cadaveric study.

This waiver is granted for projects on collections housed in the School of Anatomical Sciences.

Kind regards,



Professor Maryna Steyn
Holder: Ethics waiver



Prof Lynne Schepartz
Acting Head of School
School of Anatomical Sciences
Faculty of Health Sciences

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG	HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

Office of the Deputy Vice-Chancellor (Research & Post Graduate Affairs)

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FROM: Iain Burns
Human Research Ethics Committee (Medical)
Tel: 011 717 1252

E-mail: Iain.Burns@wits.ac.za

DATE: 01/04/2021

REF: *R14/49*

PROTOCOL NO: W-CBP-210401-01 (This is your ethics application study reference number. Please quote this reference number in all correspondence relating to this study)

PROJECT TITLE: *Research on cadaveric material*
Research conducted on donated bodies and their tissues
under sections 62-64 under the National Health Act No.61 of 2003
Formerly W-CJ-140604-1

Please find attached the Ethics Waiver Certificate for the above project. I hope it goes well and that an article in a recognized publication comes out of it. This will reflect well on your professional standing and contribute to the Government funding of the University.

MSWorks2000/Iain0007/ClearScanWaiver.wps

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG	HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

Office of the Deputy Vice-Chancellor (Research & Post Graduate Affairs)

01/04/2021

Ref: W-CBP-210401-01

TO WHOM IT MAY CONCERN

Waiver: This certifies that the following research does not require clearance from the Human Research Ethics Committee (Medical)

Investigator: Professor M Steyn
Student No. (if appropriate):
Staff No. (if appropriate): A0002304

Supervisor:

School: Anatomical Sciences
Department: Medical School
University

Project title: *Research on cadaveric material*
Research conducted on donated bodies and their tissues
under sections 62-64 under the National Health Act No.61 of 2003
Formerly W-CJ-140604-1

Reason: Statutory waiver
No living human participants will be involved in the study

CB Penny

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