

DIAGNOSIS OF EARLY CARPAL TUNNEL SYNDROME
BY THE SPHYGMOMANOMETER TEST

Thesis Submitted
for
Partial Fulfillment of
Master Degree
in
Internal Medicine

By

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M.B.B.Ch.

Dec.1975

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1986

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ACKNOWLEDGEMENT

I am honoured to express my sincere gratitude to my mostly distinguished Dr. EL SAID MOSTAFA ABOU GAMRA, Assistant Professor of Internal Meidicine, Faculty of Medicine, Ain Shams University, for his continuous encouragement and support and his guidance throughout the study.

To Dr. HASSN EL SAYED SOLIMAN, Assistant Professor of Internal Medicine, Faculty of Medicine, Ain Shams University. I owe the idea upon which I under took this study. I wish to express my deepest acknowledgement and appreciation for his valuable comments and suggestions.

I wish also to express my sincere gratitude to Dr. NADIA ABDEL SALAM, Assistant Professor of Physical Medicine, Faculty of Medicine, Ain Shams University, whose instructive insights and enthusiasm made the practial part of this study possible.

My thanks to Dr. FATMA KAMEL, Lecturer of Physical Medicine, Faculty of Medicine, Ain Shams University, for her kind help in the practical part of the study.

CONTENTS

	Page
1. INTRODUCTION	1
2. THE AIM OF THE WORK	4
3. REVIEW OF LITERATURE.	
I. Anatomy of the carpal tunnel	5
II. Pathophysiology	10
III. Pathogenesis of CTS	11
IV. Aetiology of CTS	14
V. Clinical presentation & diagnosis	23
VI. Treatment	41
4. MATERIALS AND METHODS	45
5. RESULTS AND THEIR STATISTICAL ASSESSMENT	48
6. DISCUSSION	54
7. SUMMARY AND CONCLUSION	62
8. REFERENCES	64
9. ARABIC SUMMARY.	

INTRODUCTION

INTRODUCTION

Carpal tunnel syndrome is one of the commonest painful conditions of the upper limb. It is a chronic disabling condition characterized by nocturnal discomfort, numbness of fingers in median nerve distribution and thenar muscle atrophy.

Carpal tunnel syndrome is caused by compression of the median nerve as it runs in its tunnel under the transverse carpal ligament (flexor retinaculum).

The acute compression of the median nerve in the carpal tunnel is a rare cause of acute carpal tunnel syndrome resulting from mechanical deformation with ischemic changes following rapidly if the nerve is not decompressed immediately.

The initial nerve lesion in the carpal tunnel syndrome due to chronic progressive increasing compression is an intrafunicular anoxia caused by venous congestion as a result of increased pressure within the carpal tunnel. This leads to intrafunicular oedema and nerve fibres destruction by impairing their blood supply. The final outcome is the replacement of the contents of the funiculi by fibrous tissue.

The syndrome can probably be produced by several mechanisms, involving either an increase in the volume of tunnel contents, in the presence of an unyielding wall, or a decrease in tunnel diameter. It may be idiopathic or secondary either to local pathology or a systemic condition such as rheumatoid arthritis; pregnancy; ganglion; myxoedema, acromegaly; colle's fracture; patients receiving maintenance hemodialysis therapy; cervical spondylosis and anatomical variations such as anomalous motor branch of the median nerve; anomalous muscle belly of the flexor digitorum superficialis; and projection of the distal end of the radius.

The condition is usually seen in stout-middleaged women engaged in a vigorous manual work.

The patient with carpal tunnel syndrome usually complains of burning pain, numbness and paraesthesia in the distal median nerve distribution. Atypical presentation may include shoulder pain, numbness restricted to a single finger, or increased sensitivity to cold in the fingers.

The syndrome is frequently bilateral but the dominant hand is usually affected first and most severely.

Physical examination may reveal weakness of opposition and flattening of the thenar pad due to thenar muscle atrophy. The patient with carpal tunnel syndrome may have a positive Tinel's sign, tourniquet test, Phalen's wrist flexion test or flick sign.

Most of the cases of carpal tunnel syndrome show a prolonged distal sensory and motor nerve latency on stimulating the median nerve at the wrist.

Conservative treatment in carpal tunnel syndrome may include wrist splinting, injection of hydrocortisone into the carpal tunnel and control of any underlying disease. If conservative measures fail, surgical decompression of the nerve should be done.

On our study we try to detect carpal tunnel syndrome in its early stages before neurological manifestations which are irreversible even after nerve decompression. In our work we try to elicit pain or numbness in the median nerve territory in the affected hand by occluding the venous return from the hand resulting in venous congestion within the wrist joint and in turn the carpal tunnel. This will add more pressure within the tunnel causing more compression on the median nerve.

AIM OF WORK

THE AIM OF THE WORK

The aim of this study is to develop a simple practical clinical test by which we can diagnose a carpal tunnel syndrome in its early stages.

This is in order to get the best results of treatment before the irreversible neurological complications and refer the patient to surgery at the proper time.

REVIEW OF LITERATURE

I. ANATOMY OF THE CARPAL TUNNEL

The carpal tunnel is a narrow fibro-osseous tunnel. It is formed by the deeply concave palmar surface of the carpus (the carpal groove), which is converted into a tunnel by the transverse carpal ligament (the flexor retinaculum).

The carpus:

The carpus is composed of eight bones arranged in two rows; proximal and distal rows each containing four elements. The bones of the proximal row, from lateral to medial side, are the scaphoid, lunate, triquetral and pisiform, and those of the distal row; are the trapezium, trapezoid, capitate and hamate (Gray's 1973). Fig. (1) A.

The flexor retinaculum:

The flexor retinaculum or the transverse carpal ligament is a strong thick fibrous band that crosses the front of the carpus and converts its palmar concavity into the carpal tunnel. In 1959, Tanzer, found that the proximal third of the flexor retinaculum is much thinner than the distal two thirds. It is attached to the tubercle of the scaphoid and the crest of the trapezium laterally, and the pisiform bone and the hook of the hamate medially. (Cunningham, 1976).

The contents of the carpal tunnel:

Ten structures pass through the carpal canal which are; flexor pollicis longustendon; 4 flexor superficialis tendons, 4 flexor digitorum profundus tendons and their sheaths, and the median nerve. Fig. (1) B.

The median nerve in the hand:

The median nerve is the softer tissue of the contents of the carpal tunnel.

Just proximal to the flexor retinaculum, the median nerve is lateral to the tendons of the flexor digitorum superficialis, but dorsal to the retinaculum it lies immediately deep to it and on the front of the tendons in the carpal tunnel. Immediately to the flexor retinaculum it becomes enlarged and flattened and usually divides into five or six branches, though the exact mode and level of division of the nerve are variable. (Gray's 1973).

The muscular branch is a short stout nerve that arises from the lateral side of the median nerve and runs laterally just distal to the flexor retinaculum. It gives a branch to the abductor pollicis brevis and usually giving a branch to the surface of the flexor pollicis brevis muscle. (Gray's 1973).

- 6a -

Metacarpal bones

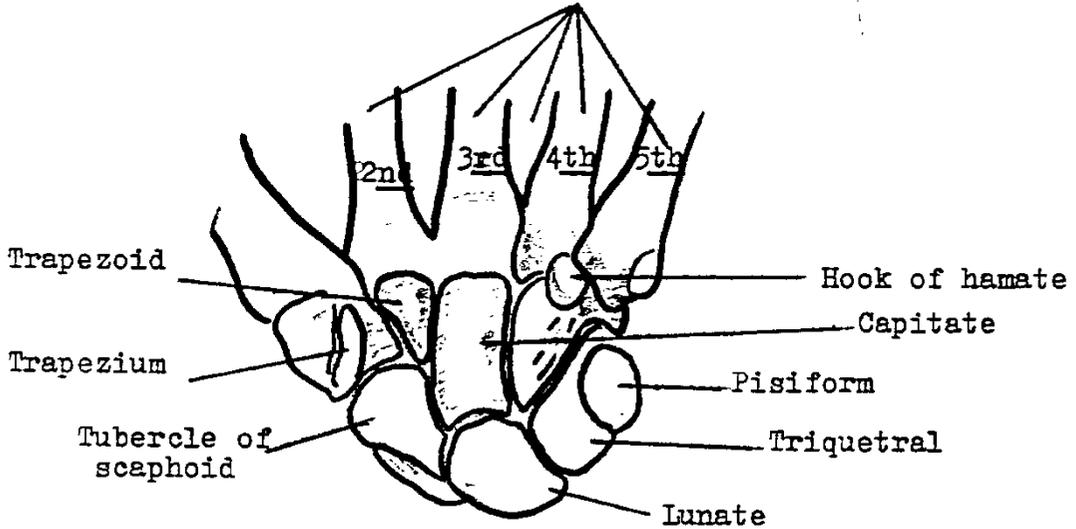


Fig. (1)A: Palmar aspect of the carpal bones of the left hand (modified after Gray's, 1973).

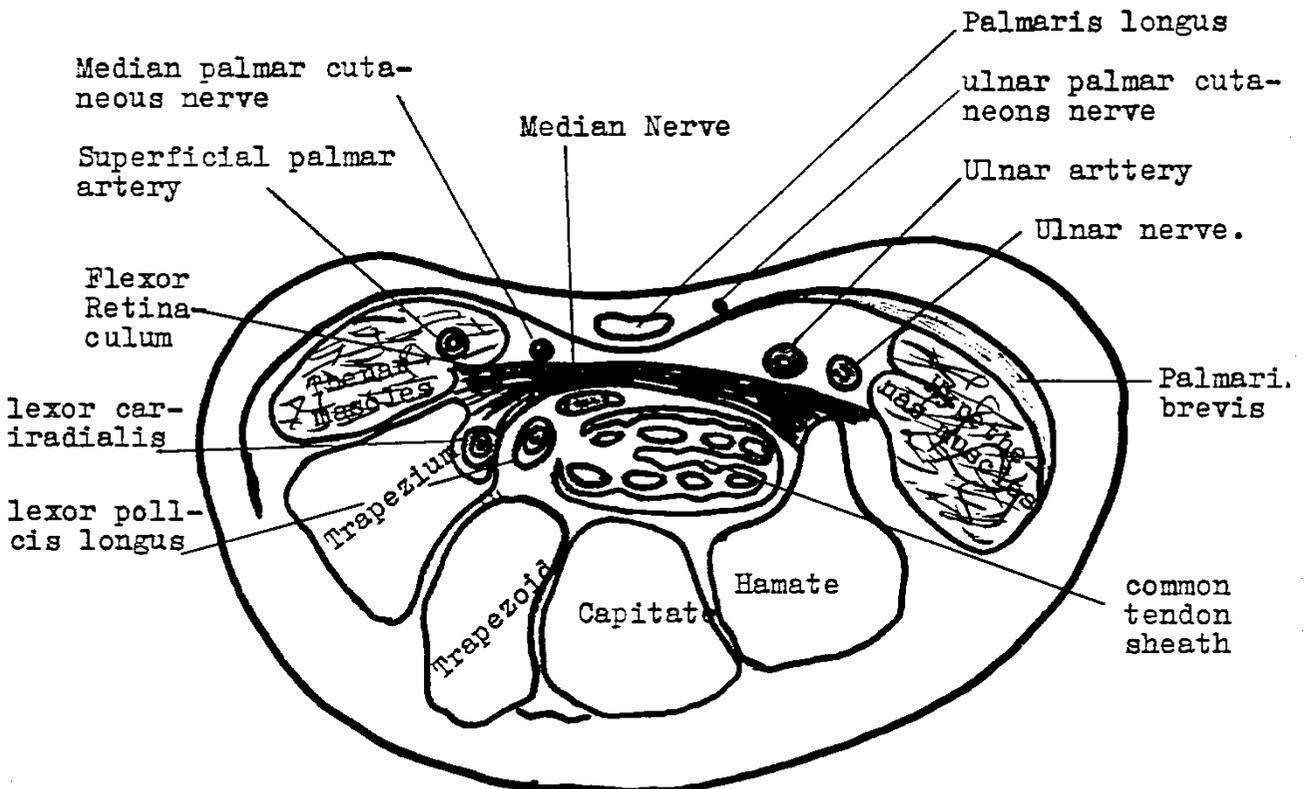


Fig. (1)B: A diagrammatic cross section of the wrist at the level of the distal carpal row. (Modified after Cunningham's, 1976).