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Mini Review

Silent Pressure: Understanding Carpal Tunnel Syndrome in the Modern Era

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Abstract

Carpal Tunnel Syndrome (CTS) is a prevalent yet often underestimated neuromuscular condition that affects hand function and overall quality of life. Characterized by compression of the median nerve within the wrist, CTS has become increasingly common in the digital age due to repetitive hand movements and prolonged device use. This article explores the anatomical basis, causes, clinical manifestations, diagnostic approaches, and management strategies of CTS. Emphasis is placed on early recognition and preventive care to minimize long-term disability. Through a comprehensive overview, the article highlights the importance of ergonomic awareness and timely medical intervention in mitigating the impact of this condition.

Introduction

Carpal Tunnel Syndrome is a condition arising from increased pressure within the carpal tunnel, a narrow passageway in the wrist. The tunnel houses tendons and the median nerve, which controls sensation and movement in parts of the hand. When this nerve is compressed, it leads to a range of sensory and motor disturbances. CTS is particularly common among individuals engaged in repetitive wrist activities, making it a significant occupational health concern

Anatomy and Pathophysiology

The carpal tunnel is bounded by carpal bones on the dorsal side and the transverse carpal ligament on the palmar side. The median nerve passes through this confined space along with flexor tendons. Any condition that reduces the space within the tunnel or increases the volume of its contents—such as

inflammation, fluid retention, or structural abnormalities—can compress the nerve. This compression disrupts nerve conduction, leading to the characteristic symptoms of CTS

Causes and Risk Factors

Several developments of Carpal Tunnel Syndrome factors contribute to the, including:

- **Repetitive Hand Movements:** Typing, assembly line work, and prolonged use of handheld devices
- **Medical Conditions:** Diabetes, hypothyroidism, rheumatoid arthritis
- **Hormonal Changes:** Pregnancy and menopause
- **Anatomical Variations:** Smaller carpal tunnel size
- **Occupational Hazards:** Jobs requiring forceful or repetitive wrist motions

Lifestyle factors such as poor ergonomics and lack of breaks during repetitive tasks further increase risk.

Clinical Manifestations

CTS typically presents with symptoms that develop gradually

- Numbness or tingling in the thumb, index, middle, and ring fingers
- Hand weakness and difficulty gripping objects

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- Pain radiating up the forearm
- Symptoms often worsen at night or with prolonged activity

In advanced cases, muscle atrophy at the base of the thumb may occur, indicating severe nerve damage

### Diagnosis

Diagnosis is primarily clinical, supported by patient history and physical examination. Common diagnostic tests include:

- **Phalen's Test:** Wrist flexion to reproduce symptoms
- **Tinel's Sign:** Tapping over the median nerve to elicit tingling
- **Nerve Conduction Studies (NCS):** Measure electrical conduction speed
- **Electromyography (EMG):** Assess muscle response

Early diagnosis is crucial to prevent irreversible nerve damage.

### Management and Treatment

Treatment depends on the severity of symptoms

#### Conservative Approaches:

- Wrist splinting, especially at night
- Activity modification and ergonomic adjustments
- Nonsteroidal anti-inflammatory drugs (NSAIDs)
- Corticosteroid injections to reduce inflammation

#### Surgical Intervention:

In severe or refractory cases, carpal tunnel release surgery is performed to relieve pressure on the median nerve. This procedure has a high success rate and is often done on an outpatient basis.

#### Prevention Strategies

Preventive measures play a vital role in reducing the incidence of CTS:

- Maintain proper wrist posture during activities
- Use ergonomic tools and workstations
- Take frequent breaks during repetitive tasks
- Perform hand and wrist stretching exercises

- Manage underlying health conditions effectively

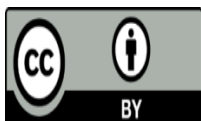
### Conclusion

Carpal Tunnel Syndrome is a common yet manageable condition when identified early. With increasing reliance on digital devices, awareness and preventive care are more important than ever. By understanding its causes, recognizing early symptoms, and adopting ergonomic practices, individuals can significantly reduce their risk. Timely medical intervention ensures better outcomes and helps preserve hand function, ultimately enhancing quality of life.

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