Joint Diseases and Related Surgery

Jt Dis Relat Surg
2025;36(2):456-460

CASE REPORT

Guyon's canal syndrome caused by mass effect after chronic dog bite hand injury

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ABSTRACT

Epidermal inclusion cysts are defined as dermal or subcutaneous epithelial cysts which are filled with keratin and lined with true epidermis. Although exceedingly rare, they can lead to pathological conditions, such as nerve compression syndrome. To the best of our knowledge, this is the first documented case of a 59-year-old woman with ulnar nerve compression at the wrist due to dog bite hand injury. An epidermal inclusion cyst was located adjacent to the ulnar nerve, resulting in significant compression. Notably, no direct connection was observed between the cyst and ulnar nerve. Surgical resection of the cyst led to complete resolution of tingling in the patient's middle and ring fingers. Although uncommon compared to the frequently reported causes of ulnar neuropathy, epidermal inclusion cysts should be considered as a differential diagnosis, particularly in patients with a history of repetitive wrist motion and trauma. A comprehensive diagnostic approach and tailored surgical interventions are needed to ensure good clinical outcomes in such cases.

Keywords: Epidermal cyst, hypesthesia, injury, ulnar nerve compression syndrome, wound.

Guyon canal syndrome, a rare manifestation of ulnar neuropathy, occurs when there is compression of the ulnar nerve passing through Guyon's canal.[1] This can lead to diverse clinical presentations due to the nerve's intricate course at the level of the wrist. Epidermal inclusion cysts (EICs) are slow-growing, keratin-filled epithelial cysts located within the dermis or subcutis. They can be classified as primary or secondary.[1] Primary EICs arise from the infundibulum of the hair follicle due to follicular orifice blockage. Secondary EICs, on the other hand, develop when follicular epithelium invaginates into the dermis due to trauma or comedone formation.

To the best of our knowledge, no cases of ulnar nerve compression at the wrist due to EICs have been reported in the literature yet. In this article, we present the first documented case of Guyon's canal syndrome due to an EIC within the hypothenar area, which likely developed from her history of chronic dog bite injuries.[2]

CASE REPORT

A 59-year-old woman with a medical history of diabetes and cerebrovascular disease was admitted with repeated dog bites to the right hypothenar eminence four years ago. The current physical examination revealed a mobile, round, firm mass measuring 2×2 cm in the affected area (Figure 1a). The absence of erythema, swelling, and tenderness indicated a non-infectious process. The patient reported pain and tingling in the right third and

Received: January 02, 2025
Accepted: March 12, 2025
Published online: April 05, 2025

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Doi: 10.52312/jdrs.2025.2136

Citation: Choi J, Lee JH, Jun YJ, Choi JY. Guyon's canal syndrome caused by mass effect after chronic dog bite hand injury. Jt Dis Relat Surg 2025;36(2):456-460. Doi: 10.52312/jdrs.2025.2136.

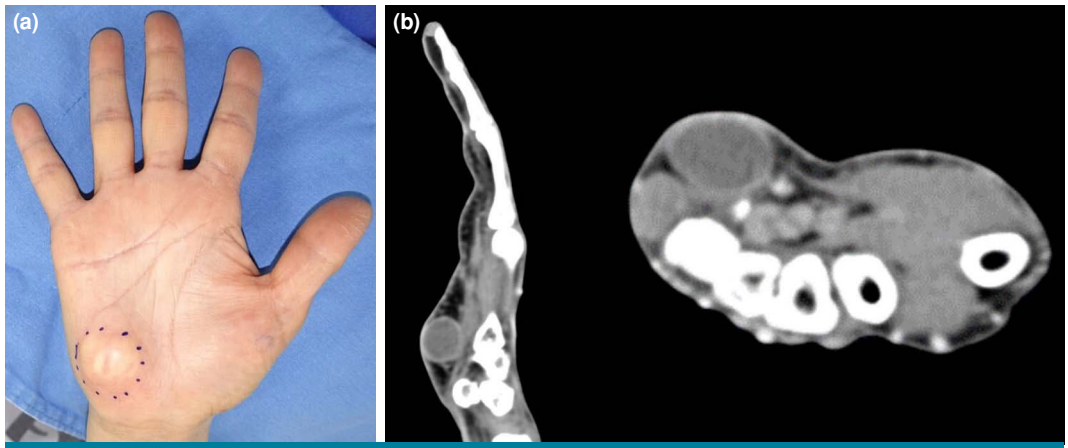

FIGURE 1. (a) Preoperative clinical photo and **(b)** computed tomography scan image.

fourth fingers, although no abnormalities were observed during finger movement. These symptoms suggested ulnar nerve neuropathy secondary to a mass effect. Computed tomography (CT) revealed a well-defined, slightly hyperdense lesion measuring 1.8×1.3×1.7 cm, with thin rim enhancement adjacent to the skin layer, consistent with an EIC (Figure 1b). She subsequently underwent excisional biopsy under local anesthesia, where the mass was found adjacent to the hypothenar muscle and palmar aponeurosis. Careful dissection ensured total excision while preserving the ulnar nerve. Histopathological examination confirmed the diagnosis of EIC which showed a cyst lined by stratified squamous epithelium with a granular layer and filled with laminated keratin flakes (Figure 2).

Postoperatively, the patient reported improvement of tingling sensation, and her hand exhibited full range of motion for all fingers (Figures 3 and 4). A written informed consent was obtained from the patient.

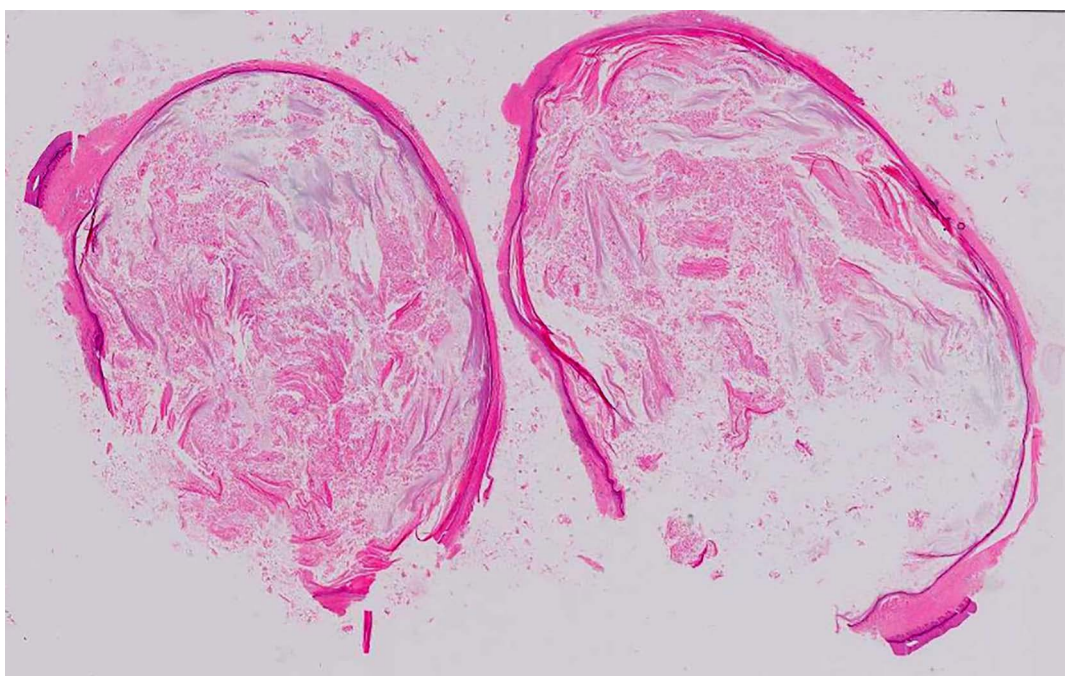

FIGURE 2. Histological findings (×10) showed a cyst lined by stratified squamous epithelium with a granular layer and filled with laminated keratin flakes.

FIGURE 3. (a) Postoperative clinical photo and **(b)** the excised mass specimen.

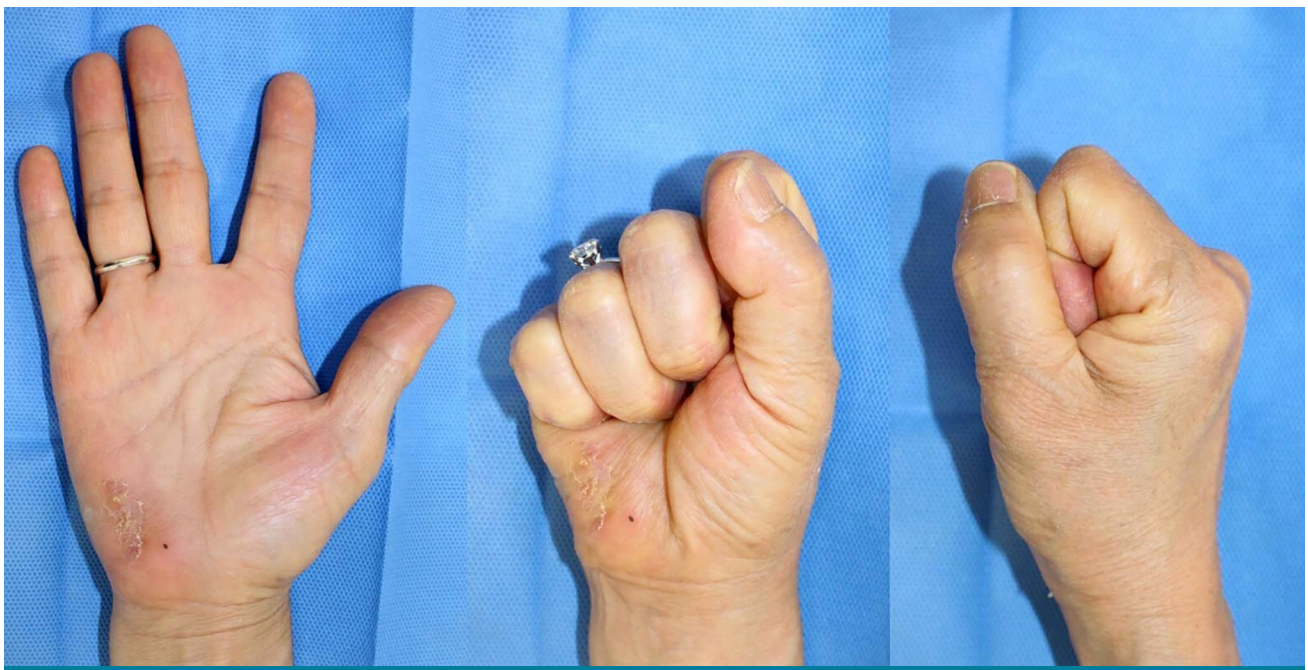

FIGURE 4. Clinical photo taken three months postoperatively showing no residual complications.

DISCUSSION

Ulnar neuropathy encompasses a spectrum of conditions affecting the ulnar nerve, including compression, trauma, and mass effects. The ulnar nerve is particularly susceptible at the levels of the elbow and wrist. The nerve courses through a groove between the medial epicondyle and olecranon at the elbow, and as it reaches the wrist, it traverses the Guyon's canal, located between the hamate and pisiform bones. Ulnar neuropathy at the elbow, known as cubital tunnel syndrome, is the second most common entrapment neuropathy after carpal tunnel syndrome.

Guyon's canal, also called the ulnar carpal canal, refers to the tunnel that houses the ulnar nerve and arteries traversing along the ulnar side of the wrist, which was first described by Jean Casimir Félix Guyon[1] in 1861. The canal is bounded by the following structures: the pisiform bone as the medial wall, the hook of the hamate bone as the

lateral wall, the palmar carpal ligament as the roof, and the transverse carpal ligament as the floor. Its length is approximately 4 cm, extending from the proximal edge of the transverse carpal ligament to the aponeurotic arch of the hypothenar muscles. Ulnar neuropathy occurring within Guyon's canal is relatively rare and presents with varying symptoms depending on the location of the lesion. According to anatomical location, Shea and McClain[3] classified ulnar nerve lesion into three types: Type 1 affecting the ulnar nerve at the canal entrance (motor and sensory deficits), type 2 affecting the deep branch of the ulnar nerve (motor deficits), and type 3 affecting the superficial branch of the ulnar nerve at the distal end of the canal (sensory deficits).

Guyon's canal syndrome can arise from various etiologies, including tumors, chronic or repetitive lesions, diseases of neighboring vessels, metabolic disorders, anatomical variations, degenerative wrist conditions, and idiopathic factors. Among the tumors, ganglions, lipomas, lipofibromas, giant cell tumors, schwannomas, neuromas, and osteoid osteomas are significant contributors to this syndrome. One case report described a 35-year-old man with pain and numbness in the fifth finger, who underwent surgical removal of a lipoma after electromyography (EMG) and magnetic resonance imaging (MRI) suggested Guyon's canal syndrome.[4] Similarly, a 40-year-old woman initially presented with acute wrist and hand pain radiating to the hypothenar region, which was aggravated with movement. Initially suspected to have flexor tenosynovitis, she developed weakness in the hypothenar muscle. Subsequent MRI revealed a soft tissue mass compressing the ulnar nerve, and surgery confirmed the presence of a ganglion cyst originating from the triquetrohamate joint.[5] Another case involved a 37-year-old woman with decreased right hand grip strength and sensation. The MRI demonstrated a mass compressing both the ulnar artery and nerves, and surgery confirmed the presence of a giant cell tumor within the tendon sheath.[6] Notably, these cases exhibited complete symptom resolution following surgical intervention, despite differences in clinical presentation.

Determining the site of the nerve compression is the first step in diagnosing ulnar neuropathy. Key areas for evaluation include the Guyon's canal and the cubital tunnel. Preservation of sensation on the dorsal surface of the ulnar dermatome suggests Guyon's canal syndrome, as this region is innervated by the dorsal ulnar cutaneous branch, originating approximately 5 cm proximal to the canal entrance. Tinel's sign, defined as the reproduction of symptoms by tapping the suspected compression site, can further aid in localization. Preoperative planning with CT and EMG can also assess mass-induced compression and localization. For specific evaluation of the relationship between masses and adjacent nerves, aberrant muscles, or vascular lesions, MRI has been suggested in previous studies.[7-10]

Epidermal inclusion cysts are the most common type of cutaneous cyst. They typically present as nodular lesions beneath the skin surface with a visible central punctum. These cysts vary significantly in size, ranging from a few millimeters to several centimeters. Unlike sebaceous cysts, which contain sebum, epidermoid cysts are filled with keratin, giving them the characteristic "cheesy" consistency. In general, EICs can be classified as primary or secondary cysts. Primary cysts arise from the infundibulum of hair follicles, whereas secondary cysts develop when the follicular epithelium invaginates into the dermis due to trauma or comedone formation. Histologically, epidermoid cysts are lined with stratified squamous epithelium and contain a keratin-filled core.[11]

In the present case, the patient's history of repeated dog bites in the hypothenar region initially suggested direct trauma-induced ulnar neuropathy. However, her neuropathy was ultimately caused by the mass effect of an EIC resulting from repetitive trauma. The presence of a palpable mass, sensory deficits, and corresponding imaging findings facilitated diagnosis and assessment. Although conservative management may be sufficient in certain cases, surgical intervention remains the mainstay of treatment for severe cases. Additionally, prompt surgical decision-making following clinical diagnosis can significantly improve patient prognosis.[12-14] In this case, surgical excision of the mass confirmed the diagnosis and resulted in complete symptom resolution. During surgery, meticulous dissection is crucial due to the proximity of the mass to the ulnar nerve to prevent iatrogenic injury. A thorough understanding of anatomical structures is, therefore, essential for successful surgical planning.

In conclusion, this case report contributes to the expanding spectrum of ulnar neuropathy etiologies, underscoring the importance of a comprehensive diagnostic approach. The successful surgical management of EIC-induced ulnar neuropathy in this case highlights the need for tailored interventions

based on accurate diagnoses to achieve optimal patient outcomes.

Acknowledgements: The authors wish to acknowledge the financial support of the Catholic Medical Center Research Foundation made in the program year of 2024.

Data Sharing Statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

Author Contributions: Idea/concept, design, writing the article, references and fundings, materials: J.Y.C.; Control/supervision, critical review: Y.J.J.; Data collection and/or processing, analysis and/or interpretation: J.H.L.; Literature review: J.C.

Conflict of Interest: The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

Funding: The authors received no financial support for the research and/or authorship of this article.

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