



# Dorsoradial Wrist Bump: Disappearance of the Snuffbox as a Sign of “SLAC”

## *Bulto dorsoradial de la muñeca: Desaparición de la tabaquera anatómica como un signo de “SLAC”*

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### Abstract

The anatomical snuffbox, a triangular region on the dorsoradial wrist, is a key anatomical landmark. Bordered by the tendons of the extensor pollicis longus, brevis, and abductor pollicis longus, it houses the radial artery and nerve branches. Pathologies such as synovial cysts, fractures, and osteophytes can alter its appearance. Studies on scapholunate ligament (SLL) injuries show that chronic damage causes the scaphoid to shift dorsoradially, initiating a degenerative process known as scapholunate advanced collapse (SLAC). This often results in the “disappearance” of the anatomical snuffbox, aiding in the identification of SLAC wrist patients alongside symptoms like pain and stiffness. The condition is driven by osteophyte formation, scaphoid subluxation, and synovitis, leading to joint instability and deformity. Traditional treatments, such as styloidectomy, may not fully address the instability. New approaches that consider the 3D wrist dynamics may be more effective in managing SLAC. Biomechanical studies suggest that SLL injuries, coupled with the loss of secondary stabilizers, cause the scaphoid to pronate and flex, resulting in a dorsal radial projection within the scaphoid fossa. Left untreated, this can progress to SLAC, often marked by the “dorsoradial wrist bump.”

### Keywords

- anatomical snuffbox
- wrist arthroscopy
- scapholunate advanced collapse

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## Resumen

### Palabras clave

- tabaquera anatómica
- artroscopia de muñeca
- colapso avanzado escafolunar

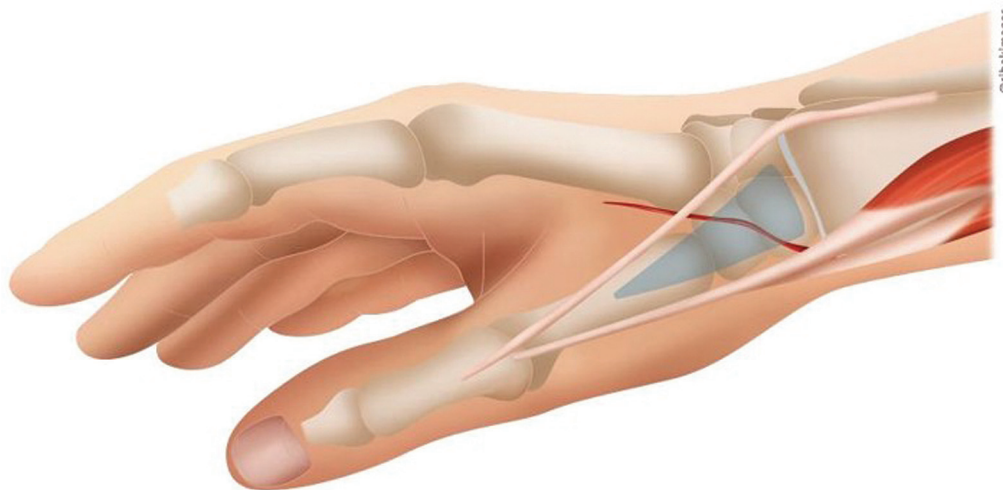
La tabaquera anatómica, una región triangular en la porción dorso-radial de la muñeca, es un punto de referencia anatómico clave. Está delimitada por los tendones del extensor largo del pulgar, extensor corto del pulgar y abductor largo del pulgar, y alberga la arteria radial y ramas nerviosas. Patologías como quistes sinoviales, fracturas y osteofitos pueden alterar su apariencia. Estudios sobre lesiones del ligamento escafolunar (SLL) muestran que el daño crónico provoca el desplazamiento dorso-radial del escafoide, iniciando un proceso degenerativo conocido como colapso avanzado escafolunar (SLAC). Esto a menudo resulta en la "desaparición" de la tabaquera anatómica, lo que facilita la identificación de pacientes con muñeca SLAC junto con síntomas como dolor y rigidez. La afección es impulsada por la formación de osteofitos, subluxación del escafoide y sinovitis, lo que conduce a inestabilidad articular y deformidad. Los tratamientos tradicionales, como la estiloidectomía, pueden no resolver completamente la inestabilidad. Nuevos enfoques que consideran la dinámica tridimensional de la muñeca podrían ser más efectivos para manejar el SLAC. Estudios biomecánicos sugieren que las lesiones del SLL, junto con la pérdida de estabilizadores secundarios, provocan que el escafoide se pronuncie y flexione, resultando en una proyección dorso-radial dentro de la fosa del escafoide. Sin tratamiento, esto puede progresar a SLAC, frecuentemente caracterizado por el "bulto dorso-radial de la muñeca".

## Introduction

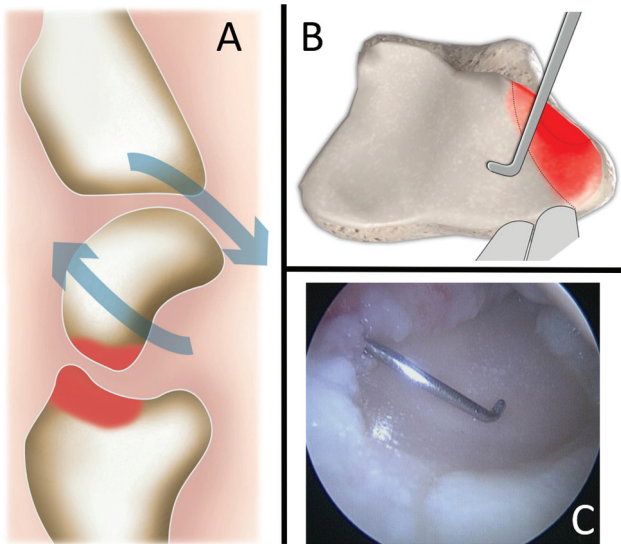
The anatomical snuffbox is a triangular region located in the dorsoradial portion of the wrist.<sup>1</sup> Its boundaries are defined by the tendons of the extensor pollicis longus (dorsally); extensor pollicis brevis and abductor pollicis longus (volar); and the dorsoradial edge of the distal radius. Its floor is formed by the carpal bones (scaphoid and trapezium) and contains the dorsal branches of the radial artery and radial nerve (►Fig. 1). The anatomical snuffbox becomes more pronounced when the thumb is extended.<sup>1-3</sup>

Although this dorsoradial portion of the wrist has a characteristic anatomical contour, some pathologies may distort its appearance such as synovial cysts, synovitis, ganglions, radial artery aneurysms, gouty arthritis, malunited distal radius fractures and scaphoid tubercle osteophytes.<sup>4</sup>

Recent biomechanical studies<sup>5</sup> have shown that chronic injury to the scapholunate ligament (SLL), associated with the loss of secondary stabilizers, shifts the scaphoid into flexion and pronation, thereby causing the proximal pole of the scaphoid to move dorsal radially within the scaphoid fossa (►Fig. 2).



**Fig. 1** The anatomical snuffbox is a triangular region located at the dorsoradial portion of the wrist. Its limits are defined by the tendons of the extensor pollicis longus (dorsally); extensor pollicis brevis and abductor pollicis longus (radially and volar) and its base is the dorsal radial edge of the distal radius. Its floor is formed by the carpal bones (scaphoid and trapezium) and contains the dorsal branch of the radial artery.



**Fig. 2** Chronic injury to the scapholunate ligament, associated with loss of secondary stabilizers, leads the scaphoid to shift in flexion and pronation, resting on the dorsal edge of the distal radius, and displacing the center of support of the scaphoid on the radius (A). View of the joint surface of the radius, with the probe through the 3/4 arthroscopic portal, showing that the degenerative process starts at the dorsoradial edge of the scaphoid fossa of the radius (in red) (B). Arthroscopic view, with the optic positioned in portal 1/2, and the probe in 3/4 showing the degenerative process caused by SLAC (C).

Thus, through direct arthroscopic visualization, we observed that the degenerative process of the SLAC (scapholunate advanced collapse) wrist starts at the dorsoradial region of the distal radius, progressing in an oblique fashion to volar and ulnar, different from what has been previously

proposed. Due to this structural change of the region, patients with moderate or severe SLAC lesions, on initial clinical assessment, present with a characteristic deformity of the wrist which we have called the disappearance of the anatomical snuffbox or the “dorsoradial wrist bump”.

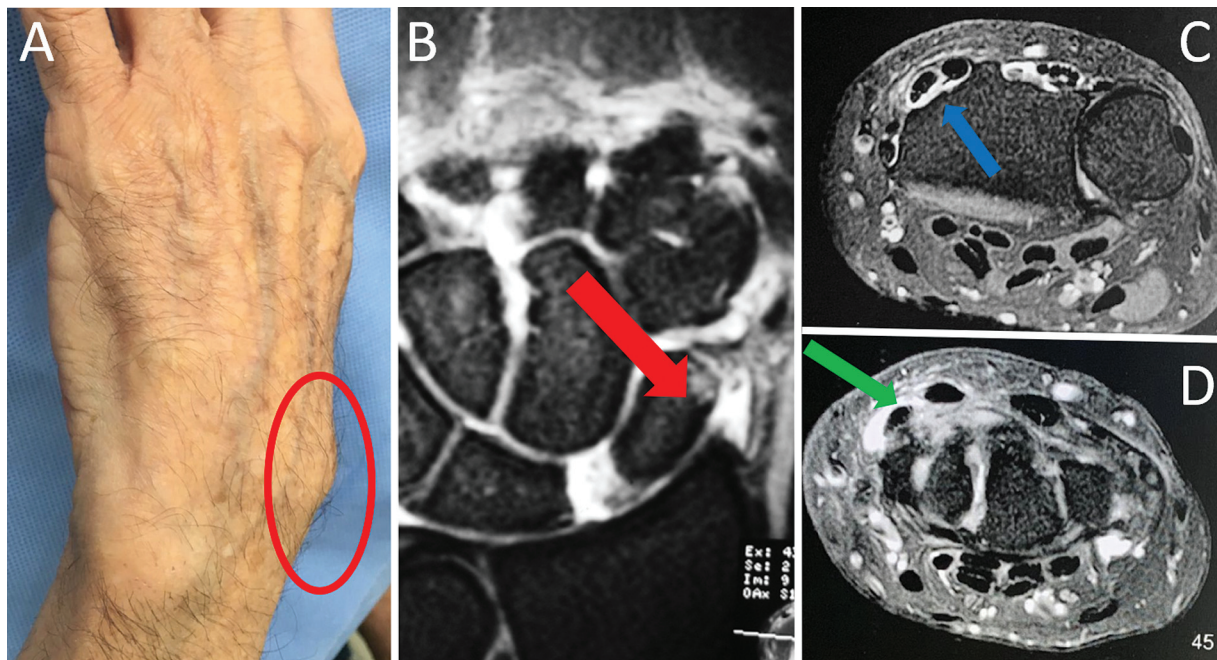
Pointing to the sign of snuffbox disappearance, we aim to alert doctors that patients with SLAC wrists, in addition to the classic symptoms of pain, stiffness, and loss of strength, will present with a loss of the normal contour of the dorsoradial edge of the wrist, along with an increased volume of that region. The osteophytes that form on the edge of the distal radius (at the scaphoid fossa), the rotatory subluxation of the scaphoid, causing protrusion of the proximal pole of the scaphoid, and the chronic inflammatory process can cause joint capsule thickening, synovitis, and edema of the radial extensor tendons (►Fig. 3).

## Discussion

The term anatomical snuffbox comes from the ancient habit of using this region to spread and inhale tobacco products, such as snuff, a practice considered elegant in 20<sup>th</sup> century Western civilization.<sup>3</sup>

Nowadays, the anatomical snuffbox is of significant clinical importance, being an anatomical landmark for some surgical procedures such as arterial catheterization, percutaneous fracture fixation, and placement of arthroscopic portals.<sup>5,6</sup>

With the improvement in the quality of imaging tests, such as computed tomography, magnetic resonance imaging, and arthroscopy, we have a better understanding of carpal pathology. This has allowed us to re-examine many of the



**Fig. 3** Patient with SLAC wrist, showing the abnormal contour of the dorsoradial region of the wrist, with a “dorsoradial wrist bump” and the disappearance of the anatomical “red circle” (A). Magnetic resonance images of this patient reveal a local increase in volume caused by osteophytes (red arrow), rotatory subluxation of the scaphoid, and synovitis of the radial extensor tendons (blue and green arrows) (B and C).



biomechanical theories and classifications that were described based on two-dimensional X-rays that have been re-evaluated.<sup>7,8</sup>

The SLL is an important stabilizer of the central portion of the carpus and its injury, associated with the loss of secondary stabilizers, may generate instability that may evolve into arthrosis. The lunate extends and supinates while the scaphoid flexes and pronates out of the scaphoid fossa.<sup>5</sup> This rotatory deformity of the scaphoid with dorsal subluxation results in a reduction of its contact area with the radius. A 20-degree scaphoid flexion causes a 77% loss its congruency within its facet.<sup>9</sup> Watson and Ballet showed that this substantial change in the bearing area is due to the elliptical shape of the radioscaphoid joint, making it more susceptible to wear, which typically does not occur between the radius and the lunate joint, which has an oval or spherical shape.<sup>8</sup>

This degenerative SLAC arthropathy is secondary to a change in the load distribution caused by an unstable scaphoid.<sup>8</sup> To date, little is known about the true natural history of the SLL lesion. Despite this, there is uncertainty as to whether all patients with a complete SLL lesion will progress to a an SLAC wrist and how long this progression take.<sup>10</sup>

Watson and Ballet described SLAC arthritis into three types.<sup>11</sup> The initial stage results in degeneration of the radial styloid, with its mirror image in the scaphoid (Type 1); and is classified as moderate (Type 2) when the degenerative process is located throughout the scaphoid fossa of the radius, sparing the lunate fossa. In advanced SLAC (Type 3), the midcarpal joint is affected, with arthrosis between the capitate and lunate bones.

Patients with moderate or advanced SLAC have complaints of stiffness with loss of mobility, pain on local palpation, and loss of wrist and hand strength.<sup>6</sup> In addition, there is a sign that has not yet been explored, which is the disappearance of the anatomical snuffbox. Thus, when initially assessed, this patient may be mistaken for a tumor or a rheumatic lesion.

We believe that this new concept, and the perception of wrist motion change in 3D, should lead to new approaches and procedures for the treatment of SLAC wrist in the future. Following the same logic of lesion three-dimensional and dynamic assessment, classic procedures such as styloidectomy of the radius or resection of the radial column of the wrist do not seem to have a scientific basis for the treatment of SLAC, as the source of the degenerative process is not exactly there.<sup>6,8</sup>

To stabilize the joint and increase the support surface for the scaphoid, osteophytes form on the dorsoradial edge of the scaphoid fossa of the radius. The simple resection of those osteophytes, or procedures such as styloidectomy, can initially lead to an improvement in symptoms through synovectomy and relief of inflammation.<sup>6</sup> We must remember, however, that osteophytes are a consequence of instability and not the cause of the pathology, and their resection, in addition to not improving instability, may even make it

worse by reducing the support surface of the scaphoid onto the radius, leading to more instability and further advancement of the degenerative process.

## Conclusion

Advances in imaging techniques have improved our understanding of wrist mechanics, revealing the importance of assessing the three-dimensional dynamics of the wrist to accurately diagnose and manage the SLAC wrist.

The disappearance of the anatomical snuffbox can signal advanced degenerative changes in the wrist. The loss of its normal contour should alert physicians to differentiate an SLAC wrist from other common conditions.

Traditional treatments, such as styloidectomy or osteophyte resection, may provide temporary relief but do not address the underlying instability. Therefore, innovative treatment strategies are needed to tackle the root causes of the SLAC wrist.

Future research should focus on developing more effective management approaches that target the fundamental pathophysiological processes to improve patient outcomes.

## Conflict of Interest

None declared.

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