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## CASE REPORT

# Pigmented Villonodular Synovitis of the Elbow: A Case Report and Sonographic Findings

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Received 31 May, 2010; accepted 15 October, 2010

**KEY WORDS**bursitis,  
elbow joint,  
synovitis,  
ultrasonic diagnosis

Pigmented villonodular synovitis (PVNS) is a disease rarely found in the elbow, and there is limited literature describing its ultrasonographic morphology. We report a case of elbow PVNS, showing the sonographic features of a hyperechoic, heterogenous, irregularly-shaped mass. Compared to knee joint PVNS, elbow joint PVNS has less joint effusion. This is also the first article to demonstrate the increased blood perfusion of PVNS with power-mode Doppler imaging.

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Open access under [CC BY-NC-ND license](http://creativecommons.org/licenses/by-nc-nd/3.0/).**Introduction**

Pigmented villonodular synovitis (PVNS) is one of a group of benign neoplastic process that can involve the synovium of a joint (PVNS), a bursa (pigmented villonodular bursitis) or a tendon sheath (pigmented villonodular tenosynovitis). Occurrence in the elbow joint is rare; only 21 cases have been reported. We report a case of elbow PVNS along with the detailed description of its sonographic findings.

**Case report**

A 47-year-old man presented with a 5-year history of chronic intermittent painful range of motion limitation in

his left elbow. The attacks were insidious with pain, swelling, local heat and limited range of motion in his left elbow, with a duration lasting for 3–5 days. No obvious elbow swelling or limited range of motion was noted during symptom-free periods. In August 2005, the pain became persistent, and he visited our orthopedics surgery clinic. There was no major trauma history, except for practicing a folk dance involving repetitive alternating supination and pronation of bilateral forearms for about 100 times a few days before visiting our clinic. He denied any chronic disease except for hyperuricemia, and he had never had any gouty arthritis attack.

On physical examination, erythematous change with local heat and swelling was noted in his left lateral epicondyle area, and tenderness was also noted over the left lateral epicondylar groove. Under the impression of lateral epicondylitis, nonsteroidal anti-inflammatory drugs were prescribed and his symptoms improved. However, intermittent left elbow pain was still noted, but it was usually

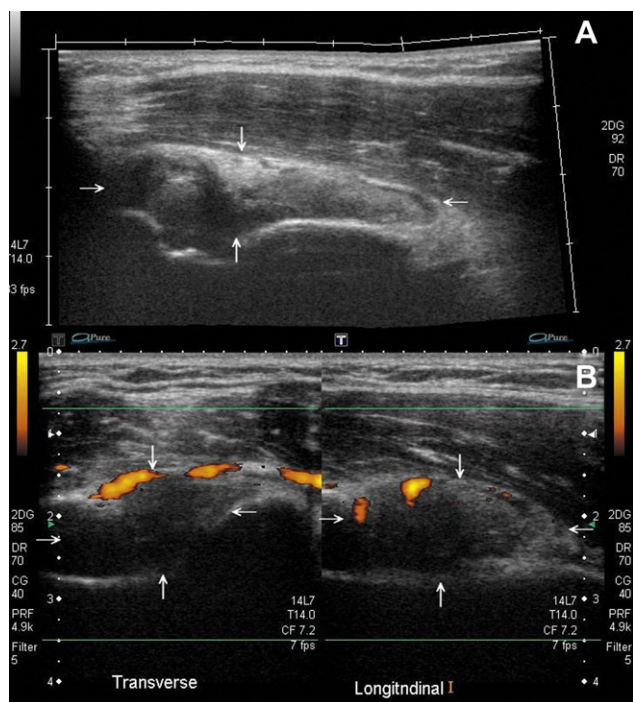
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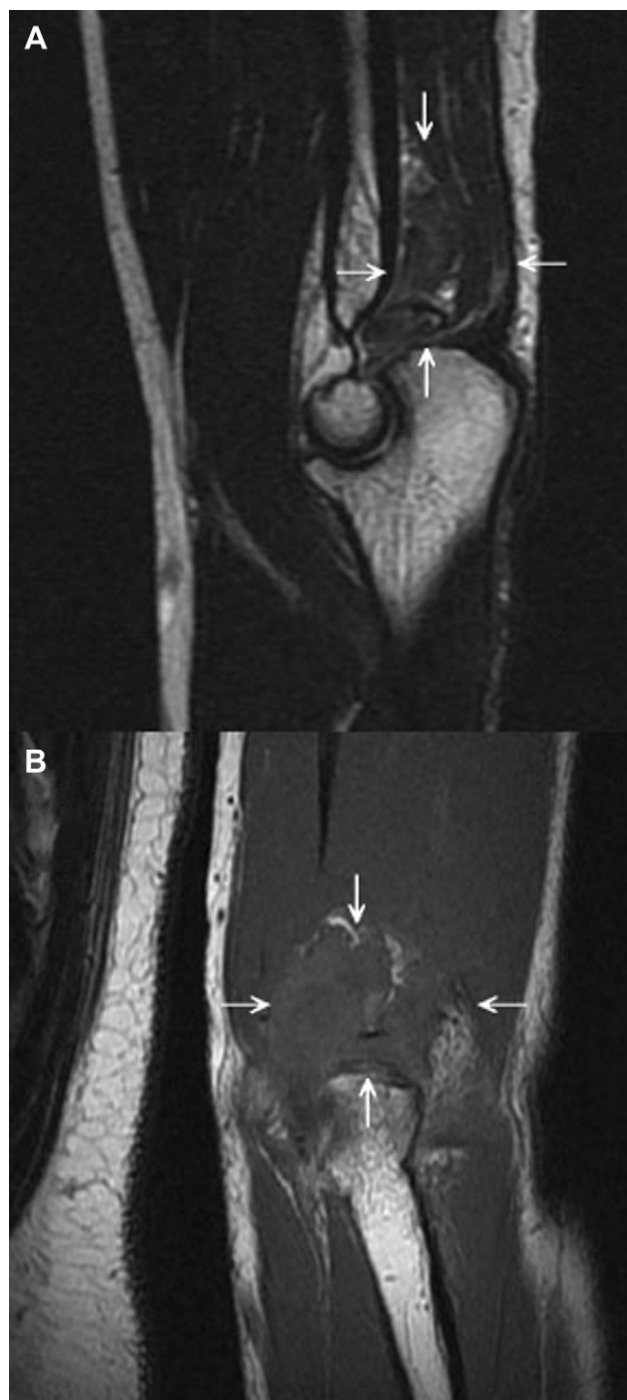
mild and would resolve spontaneously without medications. He visited our orthopedic department in April 2009. Increasing left elbow pain and swelling was noted. Musculoskeletal ultrasound examination was arranged, which showed multiple hyperechoic and heterogenous masses at the olecranon fossa, below the triceps tendon, extending to the posterior-medial aspect (Fig. 1). The shape was irregular and mildly increased blood perfusion was noted under power-mode Doppler imaging. Under the tentative diagnosis of soft tissue mass with synovial hypertrophy, magnetic resonance imaging (MRI) was arranged and performed (Figs. 2 and 3). It showed thickened synovium with intrasynovial masses of low to dark signal intensity in both T1- and T2-weighted images and moderate contrast enhancement in the posterior aspect of the elbow joint, and there was mild adjacent cortical erosion of the dorsum aspect of the distal humerus. The orthopedist suggested surgical intervention, but the patient declined.

## Discussion

As the name of PVNS implies, it is characterized by villous, nodular or villonodular proliferation of the synovium and pigmentation from hemosiderin. The most commonly affected site is the knee, followed by the hip, wrist, ankle, and shoulder. Elbow involvement of PVNS is rare; a review of the literature in 1999 [1] showed 18 cases were reported from 1941 to 1995. Another three [2–4] cases have been

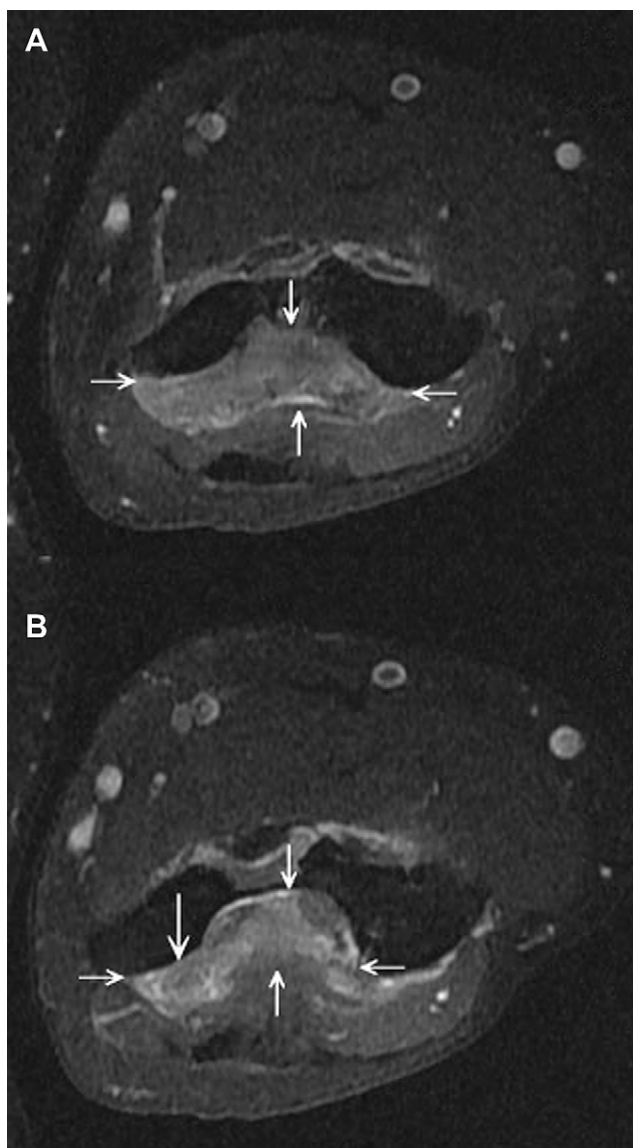


**Fig. 1** Sonographic pictures of the PVNS in the left elbow. (A) Longitudinal view on the olecranon, a hyperechoic, heterogenous, irregularly-shaped mass was noted at the olecranon fossa, below the triceps tendon, extending to the posterior-medial aspect; (B) transverse and longitudinal view under power-mode Doppler showed increased perfusion of the irregular mass.



**Fig. 2** Sagittal MR images. (A) A fast spin-echo T2-weighted MR image showed a low-signal-intensity mass with mild adjacent cortical erosion of the dorsum aspect of the distal humerus; (B) a T1-weighted MR image showed a low-signal-intensity mass. MR = magnetic resonance.

reported sporadically. However, only one report had a brief description of the sonographic picture [2] of the elbow PVNS, showing a small amount of joint effusion and synovial hypertrophy without intra-articular loose bodies. No information on the nature of blood flow was ever reported. Power-mode Doppler has been applied in musculoskeletal



**Fig. 3** Transverse axial T1-weighted image gadolinium-enhanced MR image. (A) Significant contrast enhancement corresponding to soft-tissue lesions and thickened synovium; (B) a region of irregular area with less prominent enhancement is related to an area with more concentrated hemosiderin deposition (arrow). MR = magnetic resonance.

ultrasound in recent years for the evaluation of blood flow in the soft tissue [5], which is most important in investigating mass-like lesions. Our case is currently the only report presenting the Power-mode Doppler picture of elbow PVNS, which revealed increased blood perfusion pattern.

Though there was no pathological confirmation in this case, MRI is a highly diagnostic tool for PVNS [6] with a positive prediction rate of about 85% [7].

MRI findings correlate to pathological findings well, especially when there is hemosiderin deposition. The “blooming effect” in MRI due to the magnetic susceptibility artifact from the presence of hemosiderin is nearly pathognomonic of PVNS [8]. Other diseases with similar MRI findings, such as synovial hemangioma and hemophilic arthropathy, were excluded because the former would show serpentine vascular channels (hemangioma) in Doppler ultrasound imaging, and the latter would require a clinical diagnosis of hemophilia. Both of the above findings were not present in our case.

PVNS is most prevalent in the knee joint. Comparing our sonographic findings of PVNS in the elbow joint to that in the knee joint [9], they were almost identical, except for the feature of the joint effusion. Where markedly loculated joint effusion can usually be found in the knee, the joint effusion was unremarkable in our case. This might be due to the difference in the volume of the intra-articular space. Both pictures showed thickened synovium with an irregularly-shaped hypervascular mass. These findings suggest that musculoskeletal ultrasound is of value in diagnosing PVNS, even in rarely involved sites such as the elbow joint.

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