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## Case Report

# The magnetic resonance appearance of surfers' knots: a case report

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### ABSTRACT

Athletes are at increased risk of developing soft-tissue lesions of the lower limbs. Although the majority of these will be benign, the differential diagnosis is broad and increasingly, doctors are turning to magnetic resonance imaging (MRI) as a first-line investigation when presented with these sorts of lesions, both to narrow the differential diagnosis and exclude malignancy. We report the case of a 28-year-old Caucasian man who presented with 2 soft-tissue lesions of the right foot. History and examination of the nodules fitted with a diagnosis of surfers' knots, an unusual form of acquired, benign, connective tissue nodule that may appear over the tibial tuberosities, dorsum of the feet, and occasionally on the chest of surfers in association with repetitive microtrauma during surfing. MRI findings were consistent with this diagnosis with both lesions exhibiting T1 hypointensity and speckled T2 hypointensity with no significant blooming artifact on gradient echo imaging. When imaged with gadolinium, they demonstrated only mild contrast enhancement. MRI is a valuable tool when investigating athletes with soft-tissue lesions over the lower limbs where the possibility of malignancy must be addressed. In selected cases, MRI may be sufficient to permit a conservative approach to the management of these patients.

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## Introduction

Surfers' knots (also known as surfers' knobs or surf bumps) are a form of acquired fibrotic connective tissue nodule that

develop in response to repetitive low-grade trauma, typically over the tibial tuberosities, dorsum of the feet, and occasionally on the chest of surfers [1]. They were first reported in the 1960s in warmer regions when surfers predominantly paddled

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larger, heavier surfboards while sitting on their knees and where wetsuits that protected knees and ankles were less common [2]. According to the literature published since then, surfers' knots are nearly always benign, resolving in most cases with cessation or modification of activity. Just occasionally, surfers' knots become permanent, infected, and/or painful [3]. In these circumstances, they can be surgically excised [4].

The incidence of surfers' knots has substantially declined since the short-board revolution, in which average surfboard dimensions fell from 290 × 56 cm, to just 198 × 51 cm, presumably because surfers began paddling prone rather than on their knees [5,6]. As a consequence, surfers' knots may now present a diagnostic dilemma to doctors who encounter them. The differential diagnosis for soft-tissue nodules on the lower extremities is wide and includes tophaceous gout, rheumatoid arthritis nodules, foreign body granulomas, synovial cysts, pigmented villonodular synovitis, Morton's neuroma, lipoma, soft-tissue chondroma, synovial sarcoma, leiomyosarcoma, and giant cell tumor of tendon sheath [7]. Histologic analysis is required for definitive diagnosis in many cases [8]. An increasingly common alternative approach in selected cases is to use magnetic resonance imaging (MRI) as a first-line investigation both to narrow the differential diagnosis and in particular to exclude malignancy [9]. In support of this approach, we report a case in which MRI was used to exclude aggressive pathology and support the unusual diagnosis of surfers' knots.

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### Clinical presentation

A 28-year-old Caucasian man presented to an outpatient orthopedic clinic in Geelong, Victoria, Australia, in May 2015 with 2 soft-tissue "lumps" on his right foot of uncertain significance (Fig. 1). The largest of these, located medially at the base of the right great toe arose 5 years before presentation. The smaller of the 2 masses, on the medial aspect of the patient's midfoot, arose 10 years before presentation. The patient attributed both foot lesions to repeated microtrauma during surfing, explaining that when he flexed his knee beyond 90 degrees while riding a wave his foot rubbed against his 180 × 45-cm<sup>2</sup>-epoxy fiberglass-reinforced board. Both lumps had grown slowly since first noticed but had changed size minimally over the past few years. From time-to-time, the growths made shoes feel tight, but they were never a source of significant pain, never bled, and never showed signs of infection.

On further questioning, the patient described 2 further lumps, located on the anterior surface of his chest. Again, the patient attributed the lumps to microtrauma during surfing. The chest lumps became more pronounced after surfing trips to Bali where the patient surfed without use of a wetsuit.

The young man had surfed between 2 to 3 times per week for 2 to 3 hours at a time, since the age of 13 years. He had no medical history, did not take any medication regularly, had no allergies, and had never smoked. He denied a family history of connective tissue disorders or malignancy and had worked only as an electrician since the age of 18 years.



**Fig. 1 – Appearance of a 28-year-old man's right foot exhibiting 2 lumps for investigation. The first and largest of these lumps is evident medially over the base of the great toe, at the level of the first metatarsalphalangeal joint. The smaller lesion appears over the medial aspect of the patient's midfoot, in approximation with the navicular.**

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On examination, a 4 × 2-cm nodule was noted medial and plantar to the first right metatarsophalangeal joint (MTPJ). A second nodule was located medial to the right navicular and measured approximately 3 × 1 cm in size. Both lesions were smooth, nontender, soft but nonfluctuant and free of overlying erythema or skin breakdown. The chest lumps were smaller, the largest measuring less than 1 cm in diameter and were located in the midclavicular line over the 12th ribs bilaterally.

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