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## Case Report

# Giant epidermal inclusion cyst of the axilla: a case report with diagnostic ultrasound imaging features ☆,☆☆

Ji Young Lee, MD\*

Department of Radiology, Ilsan Paik Hospital, Inje University College of Medicine, 170 Juhwa-ro, Ilsanseo-gu, Goyang, Gyeonggi-do 10380, Republic of Korea

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## ABSTRACT

Epidermal inclusion cyst is a relatively common benign lesion of the skin, and it can occur anywhere in the hair-bearing area of the body. It usually appears as an asymptomatic mass, which is less than 4 cm in size. However, rarely it can occur as a large mass in the axilla, and in such cases, the location and size tend to cause more complications. The author encountered a patient with a large epidermal inclusion cyst of the axilla. Ultrasound examination showed an oval-shaped hypoechoic subcutaneous mass with dermal attachment, intraleisional echogenic reflectors, filiform anechoic areas, and no vascularity. These characteristic imaging features could lead to an accurate preoperative imaging diagnosis without biopsy and avoid subsequent complications. Excision of the mass was performed due to discomfort because of the large size and growing nature of the lesion, and histological examination confirmed the diagnosis of an epidermal inclusion cyst. Therefore, recognition of diagnostic ultrasound features of this entity may enable an accurate preoperative diagnosis, even when it has an unusual size and location.

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## Introduction

Epidermal inclusion cysts (EICs) are common benign cutaneous cysts, which are lined with stratified squamous epithelium and contain keratinous debris, cholesterol, or sebaceous materials [1,2]. Although they can occur anywhere in the hair-bearing area of the body, they most commonly involve the

scalp, face, neck, trunk, and back. Less than 10% of these lesions occur in the extremities. They usually appear as asymptomatic dermal or subdermal lumps, which are less than 4 cm in diameter and grow slowly without medical attention or treatment. However, if an EIC is more than 5 cm in maximal diameter, it is considered a giant epidermal inclusion cyst, which can cause the patient discomfort, and requires surgical excision as it does not regress with medical treatment alone

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\* Corresponding author.

E-mail address: [drleeji@paik.ac.kr](mailto:drleeji@paik.ac.kr)<https://doi.org/10.1016/j.radcr.2021.10.007>1930-0433/© 2021 The Authors. Published by Elsevier Inc. on behalf of University of Washington. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

[3,4]. Preoperative diagnosis is important for deciding or planning further treatment or management, and imaging-guided biopsy may be required for this purpose. However, iatrogenic rupture during biopsy, just like spontaneous rupture, may release non-absorbable keratin materials from the cyst, which can irritate the surrounding tissues and cause secondary foreign body reaction, granulomatous reaction, or abscess formation [4]. Therefore, if the typical imaging findings of EICs could be identified, it may help in making a preoperative imaging diagnosis without performing a biopsy even if the cyst has an unusual size or location, thereby preventing subsequent complications such as rupture and inflammation. The author encountered a male patient with a large EIC in the axilla, and the characteristic ultrasound features led to an accurate preoperative diagnosis in this patient.

### Case report

A 43-year-old man presented with a palpable mass in the left axilla, which had been growing for the past two years. He had a medical history of coil embolization and clipping for a brain aneurysm and was taking anticoagulant medication. Physical examination revealed a large, soft, and non-tender mass in the posterior axillary fossa. There was no erythema or bruising. Laboratory test results were within the normal range. The referring physician's clinical impression was lipoma. Mammography showed a circumscribed mass in the subcutaneous fat layer of the axillary fossa (Fig. 1). On gray-scale ultrasound, the mass was located in the subcutaneous fat layer with dermal attachment and demonstrated a circumscribed margin, ovoid shape with homogeneously hypoechoic echogenicity, intralésional filiform anechoic areas, and echogenic reflectors (Fig. 2A). There was no intra- or perilesional vascularity on color Doppler evaluation (Fig. 2B). These findings were suggestive of an EIC. Because of the characteristic imaging findings, and concerns about the complications that may arise in case of a rupture, preoperative tissue confirmation was not performed. The patient underwent local excision of the lesion because of the discomfort due to its large size and growing nature. Histopathological examination of the excised mass revealed a smooth-walled cyst, which was lined with squamous epithelium and filled with keratin. The lining epithelium had a granular layer with absence of significant nuclear atypia. Consequently, the diagnosis of EIC was confirmed (Fig. 3).

### Discussion

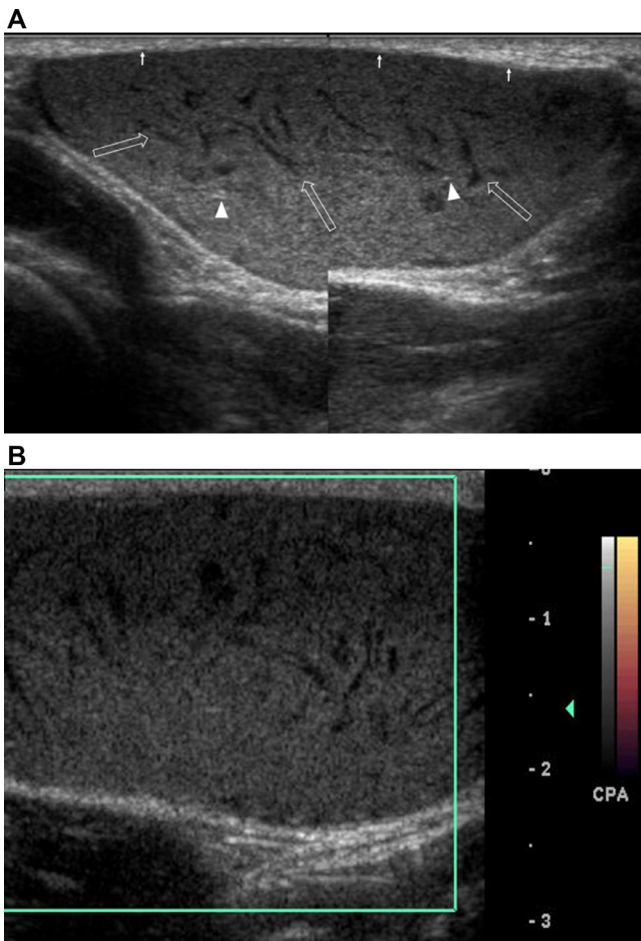
EICs, also known as epidermal cysts, epidermoid cysts, sebaceous cysts, or infundibular cysts, are benign cystic lesions, which are characterized by the proliferation of epithelial cells locally in the dermal or subcutaneous tissue, leading to the formation of a keratin-filled cyst [1,2]. They may result from the obstruction of a pilosebaceous follicle, migration of epithelial cells during embryogenesis, or acquired reasons such as trauma or surgery [3-5]. Clinically, they appear as solitary



**Fig. 1 – Axillary mammography view shows a circumscribed mass in the subcutaneous fat layer of the axillary fossa**

slowly growing lumps with sizes ranging from a few millimeters to a few centimeters, with or without a central characteristic punctum. Multiple EICs can occur in patients with Gardner syndrome, which is also associated with intestinal polyposis, osteomas, and thyroid nodules [1-3]. Giant EICs, more than 5 cm in diameter, have been described in previous case reports along with clinical and imaging findings [3-8]. However, occurrence of a giant EIC in the axilla, as in the present case, has not been reported in the imaging literature.

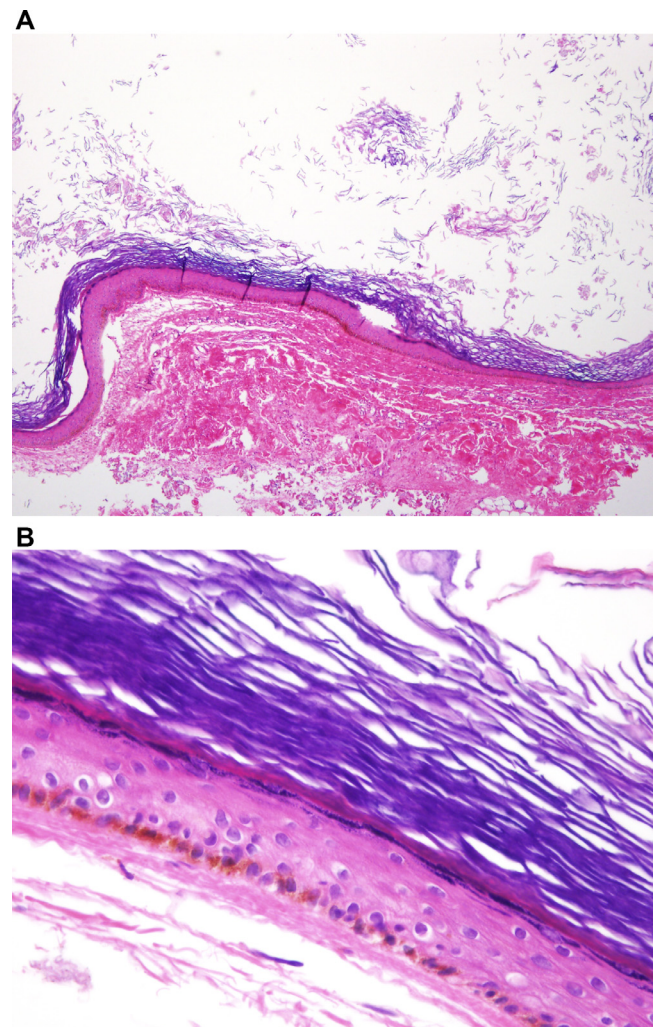
Ultrasound is considered as the first-line modality for the evaluation of superficial soft tissue masses, including those in the skin because of its detailed resolution, lack of radiation, cost-effectiveness, and easy availability compared to other modalities such as computed tomography (CT) or magnetic resonance imaging (MRI) [9]. In the evaluation of palpable lesions in the axilla, ultrasound can detect and localize the lesion, as well as differentiate lymph nodes or soft tissue masses that may require preoperative tissue confirmation. However, if there are characteristic or distinctive findings on ultrasound imaging, an appropriate sonographic diagnosis can be made without performing a biopsy and may avoid further unnecessary examination [10]. According to previous



**Fig. 2 – A & B.** Ultrasound shows a circumscribed, ovoid shaped, subdermal mass with intralesional filiform anechoic areas (open arrows), echogenic reflectors (arrowheads), and dermal attachment (small arrows) (A). On color Doppler study, no intralesional blood flow can be seen (B)

studies [1,2,8,11,12], the characteristic sonographic features of an unruptured EIC can be summarized as an oval shape, clear demarcation, and subcutaneous location with dermal attachment. Echogenicity varies depending on the contents, amount, and arrangement of keratin debris or lamellae in a pseudo testis pattern, concentric ring or onion skin appearance, target appearance, or heterogeneous echotexture. Notable specific findings are intralesional bright echogenic reflectors, filiform anechoic areas (disorganized or peripherally clumped) that are pathologically correlated with the keratin and cholesterol contents, and absence of intralesional vascularity on a color Doppler study even in the case of large lesions. Tract-to-skin or submarine signs might be related to the punctum on the skin of an EIC [9,13].

The known complications of EICs are rupture, inflammatory changes, or abscess formation, which can make an accurate imaging diagnosis difficult due to a lobulated or irregular shape, poorly defined margin, and increased intra-/perilesional vascularity [9,10]. Rarely, malignant degeneration



**Fig. 3 – A & B.** Histopathologic examination shows that the cyst is lined by squamous epithelium and contains keratin (hematoxylin and eosin stain, original magnification  $\times 40$ ) (A). The lining epithelium shows a granular layer along with absence of significant nuclear atypia (hematoxylin and eosin stain, original magnification  $\times 400$ ) (B)

or squamous cell carcinoma development within the EIC wall have been reported in approximately 2% cases, and solid nodules associated with the cyst wall should raise the suspicion of malignant degeneration [8]. In the axillary area, a ruptured EIC was reported to cause axillary web syndrome in a previous case report [14]. Small asymptomatic EICs do not require treatment, but for a symptomatic giant EIC, complete excision of the cyst and its contents is the treatment of choice. Incomplete removal of the cyst can lead to chronic inflammation and recurrence.

In conclusion, an EIC can occur in the axilla as a palpable mass, and recognition of its diagnostic ultrasound features can lead to an accurate preoperative diagnosis even when the EIC has an unusual site and size, thereby preventing subsequent complications such as rupture and inflammation.

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## Patient Consent

Written informed consent was not necessary because no patient data has been included in the manuscript.

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