

Skin Tumors on High Frequency Ultrasound: A Serial Case Report and Literature Review

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Abstract: Many kinds of skin masses appeared as well-defined hypoechogenic lesion in ultrasound. Higher-frequency sound waves enable high resolution observation of the anatomical level and internal echogenic. In this study, 4 typical cases were observed by utilizing high resolution ultrasound (HRUS) at 10 to 20 MHz. Ultrasound shows most Basal cell carcinoma (BCC) was irregular-shaped while other kinds of cases appear as oval-shape, meanwhile, epidermoid cyst was located in the subcutaneous layer while the other three kinds of masses were located in the dermis. Color Doppler shows eccrine poromas and BCCs have flow signals, while dermatofibromas and eccrine poromas show a lack of vascularity. HRUS can provide noninvasive and effective diagnostic information for skin masses before surgery and can help the clinician evaluate whether the tumor was completely removed after surgery.

Key words: Skin neoplasms; Ultrasonography; Poroma

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Ultrasound provides real-time cross-sectional images in a very cost-effective manner, even in the skin and deep structures. High-resolution ultrasound permitted the visualization of the three skin layers and the dermal lesions caused by striae. Before surgery, it can provide information about tumor type and size, locate the existence of surrounding vessels, identify the best location for the incision, and set the range while viewing the ultrasound screen in real time with the patient. It can also help the clinician evaluate whether the tumor was completely removed after surgery.

Case reports

Case 1: Dermatofibroma

A 54-year-old woman presented with a 2-year history of single, brown hue papule over the back, and aggressively growing recently. High-resolution ultrasound examination (frequencies above 10–20 MHz) showed that a well-circumscribed hypoechoic lesion of size 5×3mm located at the dermis layer. Color Doppler imagine examination showed no signs of vascularity within or around the tumor. Pathology result is a (subcutaneous mass) dermatofibroma (Fig. 1).

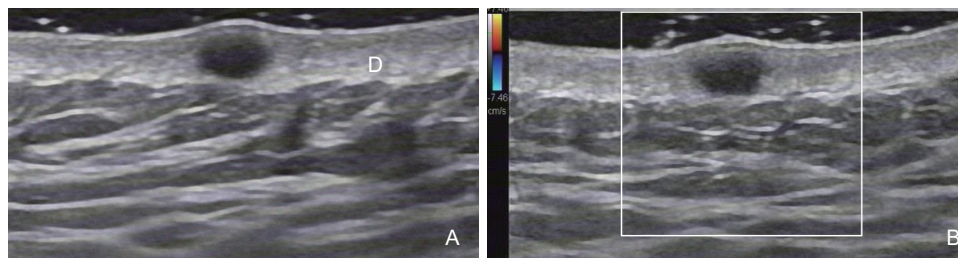


Figure 1 A dermatofibroma in the dermis. (A) Grayscale sonography showed a 5×3mm well-circumscribed hypoechoic lesion located at dermis (D); (B) Color Doppler imagine showed no blood flow signals within or around the tumor.

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Dermatofibroma (DF) is a common benign fibrous histiocytoma which commonly involves the limbs or the trunk. It typically presents as a firm to hard, often hyperpigmented, slow-growing plaque or nodule. Ultrasound examination often shows that a round hypoechoic lesion in the dermis and a lack of blood flow signals within and around the tumor.

Case 2: Epidermoid cyst

A 54-year-old female patient complained with a painless solid and mobile lesion on the neck for 4 months. Ultrasound images showed an irregular-shaped

hypoechoic cystic lesion in dermis and subcutaneous fat layer with measuring 6×3mm in size. There was no blood flow signals within the mass. Pathology result is an epidermoid cyst with rupture and absorption reaction (Fig. 2).

Epidermoid cyst (EC) is a common, benign cystic lesion derived from the surface epithelium to grow under the skin often resulted from trauma. Sonographic features of most ECs appear as hypoechoic masses, with or without calcifications, containing variable echogenic foci and display posterior sound enhancement without color Doppler signals [1].

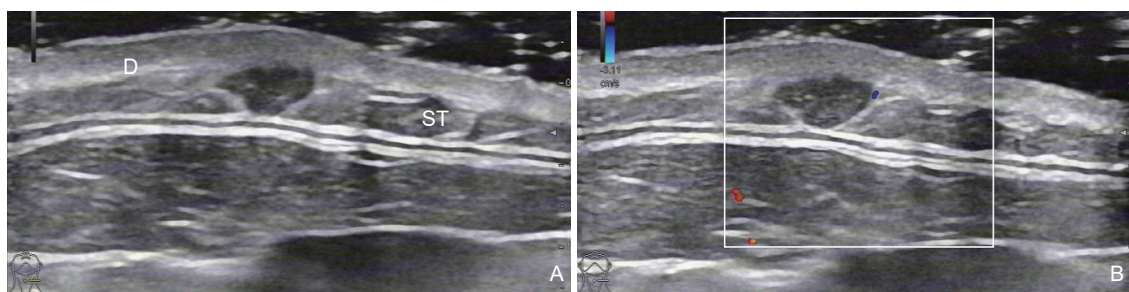


Figure 2 A epidermoid cyst bellowed dermis (D) and in subcutaneous fat layer (ST). (A) Ultrasound scan found a 6×3mm irregular-shaped hypoechoic cystic lesion in subcutaneous fat layer; (B) Color Doppler showed no blood flow signals in the lesion.

Case 3: Eccrine poroma

A 59-year-old female presented with a nodule, slightly elevated, on the left foot sole for more than 20 years. Ultrasound revealed a solid hypoechoic nodule measuring 20×60mm in diameter, well defined in epidermis and the dermis is complete. Color Doppler showed cord-like blood flow signals. Pathology result is a (left plantar) eccrine poroma (Fig. 3).

Eccrine poroma is a benign neoplasm of the sweat glands' origin an Epidermoid cyst ting from the intraepidermal eccrine duct. It is generally slow growing and asymptomatic for the patient, but it has a chance to

develop 'malignant' poroma. This tumor exhibits acral distribution (sole, palm), and is rarely encountered in the head and neck area. Goldman et al. [2] reported that the most common location for eccrine poroma is the foot, followed by the hand. The sonography image shows an erythematous or flesh-colored, firm, solitary dome-shape and slightly elevated mass with accompanying discharge without pain. This tumor mostly occurs in middle-aged or older adults. It is easy to suffer pain, damage, bleeding and ulceration after minor injury. The sonographic appearances of poroma is a heterogeneous and hypoechoic lesion in derma with a cord-like blood

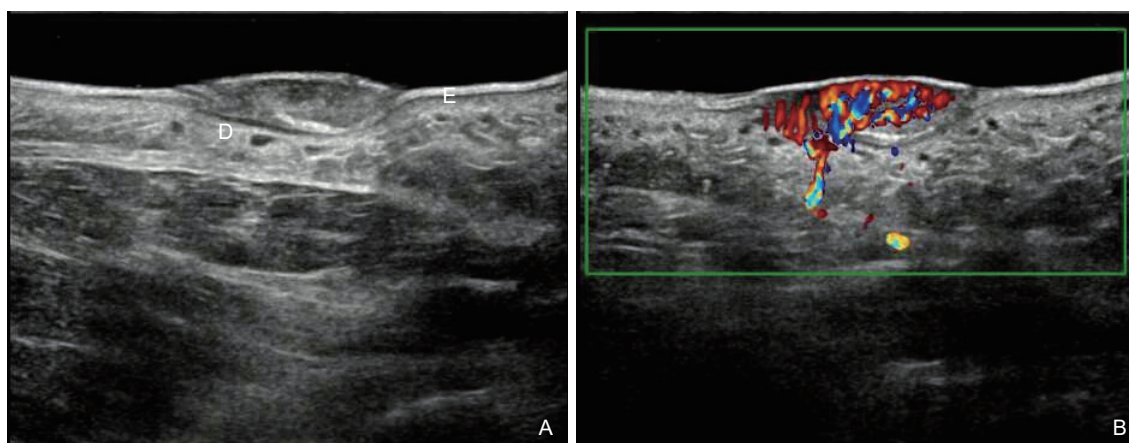


Figure 3 A eccrine poroma in epidermis (E). (A) Ultrasound revealed a 20×6 mm solid and well-defined hypoechoic nodule in epidermis (E); (B) Color Doppler showed cord-like blood flow signals.

flow signal.

Case 4: Basal cell carcinoma (BCC)

A 59-year-old man with a history of a black and painful mass on the nose for the past 6 months, the mass has recently progressive grown. Sonography examination shows a 12.2×9.5mm well-defined and irregular-shaped hypoechoic mass involves the dermis and subcutaneous tissue. Color Doppler sonography images showed increased blood flow in the tumor compared with the surroundings. Pathology result is a (nasal back mass) Basal cell carcinoma (BCC) (Fig. 4).

Basal cell carcinoma (BCC) is the most common type of skin cancer [3] and usually arise from the lowermost layers of the epidermis, but a small percentage may

originate from the outer root sheath of the pilosebaceous unit. The pathogenesis of BCC is correlated with the extent and duration of ultraviolet light exposure. Thus, most BCCs develop on sun-exposed skin, and almost 85% of tumors are located in the head and neck regions. BCC is generally a slow-growing tumor for which metastases is rare, but it can be highly destructive and disfiguring to local tissues when presentation is delayed or treatment is inadequate. Ultrasound often shows well-defined oval hypoechoic and heterogeneous dermal lesions; although the lesions can also affect deeper layers [4]. Commonly, basal cell carcinomas have a hyperechoic solid dermal zone, which may be a useful sign to differentiate this tumor from other types of skin cancer.

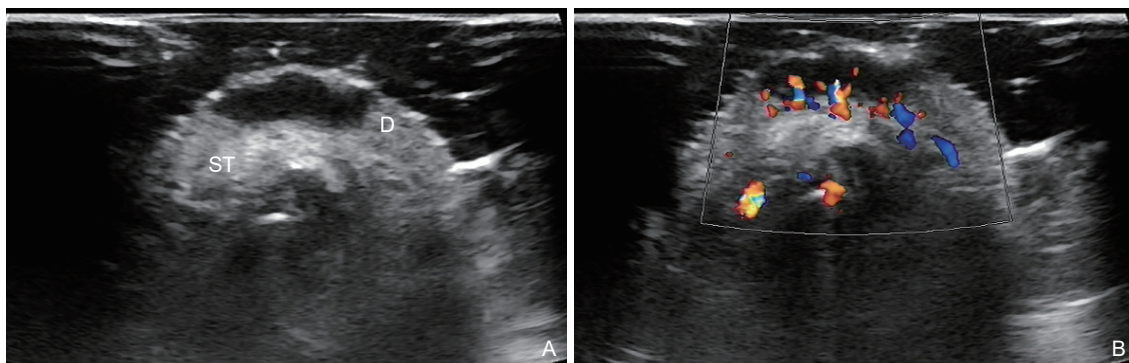


Figure 4 BCC in dermis (D) and subcutaneous tissue (ST). (A) sonography examination shows a 12.2×9.5mm well-defined and irregular-shaped hypoechoic mass involves the dermis and subcutaneous tissue; (B) Color Doppler sonography shows increased vascularity in the tumor.

Discussion

The four types of dermatological masses described in this report are all appeared as a solitude, firm lesion in the skin or subcutaneous tissue. High-resolution gray-scale and color Doppler ultrasound imaging shows a well-defined hypoechogenic lesion with or without blood flow.

DF, EC, eccrine poromas and BCC are all slow-growing tumors. However, BCC can appear progressively growing and ulceration or telangiectatic vessels, DF usually appears slowly over months and then become stable for years and sometimes regresses spontaneously and fewer than 5 % of DF recur following local excision. Most BCCs develop on sun-exposed skin because of cumulative light effects. Ultrasound shows most BCCs are irregular-shaped while epidermoid cysts and dermatofibromas appear as oval-shape. Color Doppler shows eccrine poromas and BCCs have flow signals, while dermatofibromas and eccrine poromas show a lack of vascularity. Pathologically, DF lesion locates in dermis, eccrine poromas locates in epidermis, BCC originates from epidermis but can affect deeper layers, while epidermoid cysts occur in the subcutaneous tissue.

In summary, high-resolution ultrasound is a noninvasive and nonionizing method to differentiate and measure skin layers, to identify skin or subcutaneous lesions, and to monitor the evolution of dermatological treatments noninvasively, with high-quality images.

Conflicts of Interest

The authors have declared no conflicts of interest.

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