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Correspondence and Communication

Managing a seroma with wireless mobile ultrasound device

Dear Sir,

Encountering seroma is a very common postoperative complication that physicians face. Prolonged fluid collection is troublesome as it increases the risk for infection and breakdown of the tissue under the surgical site, therefore prevention or appropriate early management is important in postoperative care. The ultrasound-guided aspiration has been one of the most versatile methods to aid in guidance of aspiration and drainage procedures. The ultrasound is relatively inexpensive and portable, especially when compared with modalities such as magnetic resonance (MR) and computed tomography (CT), and poses no known risks to the patient.[1] However, high-end ultrasound systems have the disadvantage of being bulky and heavy systems that are difficult to handle in the setting of outpatient clinic with limited space.[2] Thus we have utilized a pocket sized, wireless mobile ultrasound device in managing patients with a fluid collection.

In this study, imaging was performed with Sonon 300C (Healcerion, Seoul, Korea). The device supports two-dimensional B mode and weights 390 g including a rechargeable lithium-ion battery with capacity of 2600 mAh. The dimensions of the device are 78(W) × 219(L) × 38(H) mm and the system operates 3.5 MHz convex type transducer with ultrasound depth up to 20 cm. The Sonon 300C works in conjunction with smartphones or tablets via Wi-Fi connections, and the display resolution will depend on the device with which it is connected to. The system supports both Android and iOS and the application can be downloaded for free. Within 30 s of the device turned on, the Wi-Fi LED is on blue and the Sonon 300C can be seen on a mobile device Wi-Fi connections. After they are connected, the application is initiated with the patient information recording. The functional settings such as time gain compensation, dynamic range, focal length, depth, image filter and line density can be easily adjusted on the screen. Still images and video clips can be stored on the mobile device.

We have used the Sonon 300C in outpatient clinic to detect and aspirate seroma among ten patients undergone immediate breast reconstructive surgery due to breast cancer, and eight patients with history of lipoma undergone excision. The distance of seroma from overlying skin and soft tissue, and surrounding structures were carefully assessed before aspiration. After each procedure, compressive dressing was done, and the procedure was repeated until no fluid collection was observed. The demographics of the patients under study are shown in Tables 1 and 2.

Ten patients with history of immediate breast reconstructive surgery went through Sonon-guided examination for seroma. Seroma was found in five patients and total 43 examinations, ranging from three to 22 trials, were performed among those five until no fluid collection was observed. In case of patients with lipoma, seroma was found in four out of eight patients. Total 26 examinations were done ranging from three to 12 until no fluid collection was observed. The fluid collection was located within 4 cm of ultrasound depth in all cases, and showed hypoechoic feature which is well differentiated from surrounding echogenic structures (Figure 1). Normal breast implant usually appears anechoic with well-defined margins, but we have located seroma adjacent to hypoechoic implant (Figure 2). Serous fluid collection was successfully aspirated after localization by Sonon 300C. All patients demonstrated no fluid collection after series of procedures.

In this study, we found that the Sonon 300C is useful in management of seroma by offering reliable images in outpatient clinic which would reduce number of referrals for standard sonography, particularly if it is limited in remote or resource-strapped settings.[3] The easy handling of the system with its limited dimensions as a pocket device enables physicians to achieve a rapid overview of the surgical site,[2] and with its wireless connection to mobile devices, the healthcare professionals can send the images to elsewhere, enabling a telemedicine and point of care. Global manufacturers such as General Electric and Siemens have developed their own handheld ultrasound devices but Sonon's wireless connection to mobile devices, automatic application updates, and affordability (about $6000) make it predominant. Drawbacks of the device include absence of color and spectral doppler capability that limits applying to other medical situations, and the aspiration procedure was hard to perform under the guidance of

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Table 1 Patient characteristic with breast reconstructive surgery.

Variable	n = 10
Age (years)	48.5 ± 8.39 (35–64)
Weight (kg)	62.9 ± 12.05 (52–97)
Height (cm)	157.6 ± 4.36 (150–164)
BMI(kg/m^2)	25.32 ± 4.52 (20.70–36.96)
Diagnosis prior to surgery	
Ductal carcinoma in situ	6
Invasive ductal carcinoma	2
Invasive lobular carcinoma	2
Reconstruction by	
Direct-to-implant	7
LD pedicled flap	2
Free TRAM flap	1

Data are expressed as mean ± SD (range) or a number.
LD, latissimus dorsi; TRAM, transverse rectus abdominis muscle.

Table 2 Patient characteristic with lipoma excision.

Variable	n = 8
Male/Female	2/6
Age (years)	41.63 ± 9.89 (23–56)
Weight (kg)	70.75 ± 13.71 (52–88)
Height (cm)	164.75 ± 6.67 (157–177)
BMI(kg/m^2)	26.10 ± 5.25 (20.31–35.70)
Lipoma location	
Posterior neck	2
Back	6

Data are expressed as mean ± SD (range) or a number.

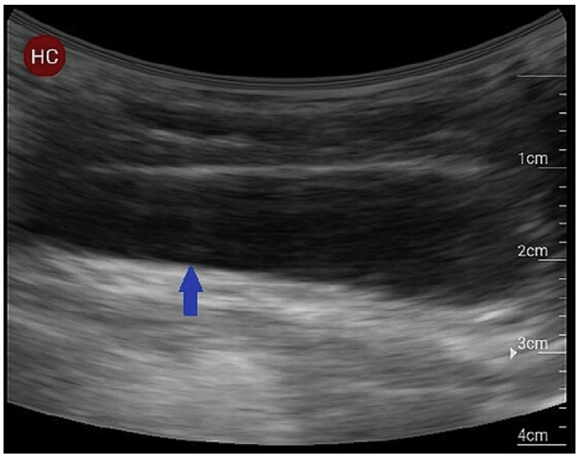

Figure 1 Seroma showing hypoechoic feature compared to echogenic underlying soft tissue. Hypoechoic seroma (arrow) within 2.5 cm from epidermis is well differentiated from echogenic surrounding structures.

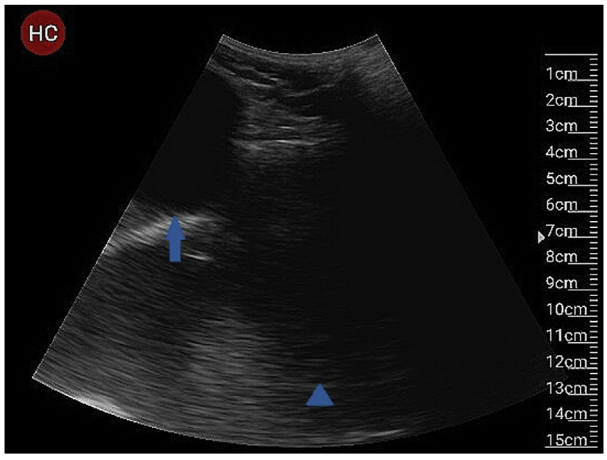

Figure 2 Seroma located above silicone breast implant. Both seroma (arrow) and silicone breast implant (arrow head) show hypoechoic feature. The implant can be differentiated with its well-defined echogenic margin, but it is not shown in this figure due to low resolution.

prove simultaneously. This is due to relative heavy weight (390 g) of the prove compared to other ultrasound devices because Sonon's prove forms integral unit to the main body. Nonetheless, primary purpose of wireless mobile sonography is focused on simple assessments supportive of the physical exam which is adequate enough in outpatient clinical settings.[4]

Yours sincerely,
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Conflict of interest statement

The authors have indicated no interest with commercial supporters.

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