

Case 1. Medical examination during a home visit at a nursing home facility

A medical examination was conducted on an 82 year old male patient with chronic heart failure following a cerebral infarct as his wheezing had become more aggravated. As a result of the examination an ultrasound was performed and multiple B-lines were identified in all lung quadrants (Fig. 2B), the jugular vein was dilated, even in a semi recumbent position (Fig. 3C) and a small urinary bladder volume was noted (Fig. 1C).

Based on the ultrasound examination a diagnosis of increased heart failure was made and a diuretic was administered. Ten minutes post diuretic the presence of B-lines had decreased, the jugular vein was less dilated (Fig. 3B) and the bladder volume was increasing (Fig. 1B). The patient's condition improved allowing the patient to receive ongoing nursing care within the nursing care facility (or home) negating the need for hospitalization and improving patient care.



Case 2. Outpatient examination

A 30 year old female patient with no prior record of illness presented to a clinic complaining of a cough that had begun the previous evening. Her vital signs were BP: 110/70 mm Hg, the pulse 92 beats per minute, and the oxygen saturation 98%. She did not have a sore throat, nasal discharge or fever but did complain of an unpleasant feeling when breathing.

An ultrasound scan of the right lung and left lower lung demonstrated normal pleural sliding in M-mode (Fig. 2C sea-shore sign) but the left upper lung demonstrated no pleural sliding resulting in the "bar-code" image in M-mode (Fig. 2D) which indicates the presence of a pneumothorax. In the mid left lung the "lung point" was demonstrated (Fig. 2E) which is the transition point between normal lung and the pneumothorax. Based on the ultrasound findings a pneumothorax of the left upper lung was diagnosed and the patient was admitted to hospital.



While outpatient staff tend to be extremely busy, the ability to conduct an ultrasound examination from behind seated patients helps reduce examination time and stress on the part of staff and patients.

Case 3. Ward or intensive care examinations

In addition to fluid assessment (lung fluid status; B-lines, pleural effusion, bladder volume, jugular vein dilation, IVC diameter changes, free abdominal fluid) and the presence of pneumothorax, the SONIMAGE P3 can aid in checking the placement of the nasogastric tube in the esophagus; checking intubation tube placement by identifying bilateral lung sliding; assisting in the insertion of a central line in a peripheral vessel.



USING THE PORTABLE ULTRASOUND DIAGNOSTIC DEVICE

Easy Body Fluids Assessment

SONIMAGE P3



Growing scope of applications

- Device can be used to aid precise fever workup (checking for a/ hydronephrosis -> complex urinary-tract infection, b/ the gallbladder/bile duct -> pyogenic cholangitis/cholelithiasis, c/ the lung -> pneumonia, d/ ascites -> peritonitis/intestinal obstruction) at a medical facility that does not have X-ray or CT scanning equipment.
- Its extensive scope of use includes the ability of identification for tip of pacemaker lead, nasogastric/gastrostomy tube and pressure-related ulcers, as well as aid in controlling constipation, joints/soft tissues -> arthritis/cellulitis and the puncturing of an echo guide into a vessel/injection.

- The probe of the SONIMAGE P3 device has a tip that can be removed and re-attached. With this feature, any future release of a body surface probe with a higher resolution for superficial sections will broaden its scope of use even further.
- By combining a networking system with SONIMAGE P3, physicians will be able to readily check echo images created by visiting nurses. The device will also enable echo images created by clinic-based physicians to be checked by physicians at cooperating hospitals, thus providing a wide range of usage scenarios including the ability to respond to cases of home-based emergencies and patient expiration.

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Body Fluids Assessment: in the bladder, lung and jugular vein

With its single probe, SONIMAGE P3 shed a light on shallow through deep area, enables everyone to check body fluids assessment easily.

Body fluids assessment (correction of dehydration or volume depletion, water removal in the case of over-hydration, and balancing between intravascular and extravascular bodily fluids) is the ultimate medical practice. It is also the basis of the medical practice that provides major indices regarding the severity of a patient's state. The device's broad scope of use ranges from applications at hospitals and clinics, physicians' home visits, home-visit nursing and medical care provided at special elderly nursing homes, and those involving mild to severe degrees of severity including dehydration, cardiac arrest and sepsis. Use of SONIMAGE P3 and the establishment of local area information networking systems may even help reduce psychological and physical stresses among residents in local communities by enabling device lags between frontline physicians and higher-level hospitals to be eliminated, and the development of smooth coordination between physicians and nurses while allowing information to be shared among workers in different fields.



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Profile

From Saitama Prefecture, Graduated from Shimane University School of Medicine, Belongs to Japan Association for Development of Community Medicine and currently working for Department of General Medicine Hiroaki University Hospital. Obtained a degree from the Kanazawa University Faculty of Functional Anatomy (from its doctoral course for adults). His publications include "Primary Care - Methodology of Community Medicine" (from Medical Science Publishing Co.,Ltd), and "Pocket- Echo Jiyu-jizai" (from CHUGAI-IGAKUSHU). He broadly specializes in community medicine, home medical care, syndrome diagnostics, chronic pain, myofascial pain, and ultrasound diagnosis (echography on musculo-skeletal, pocket echography and use of echography by workers in various field).

Bladder scanning : Assessing bladder volume

Assessing the bladder volume is quick and easy. The user simply places the transducer in the suprapubic area. The SONIMAGE P3 image enables the user to assess the bladder volume for urinary retention or hydration states.

A small bladder volume may indicate dehydration (Fig. 1C).

A large bladder volume present after the patient has been to the toilet may suggest infection or obstruction due to a large prostate (Fig. 1A). It is not necessary to obtain a precise volume, visual assessment of the image is adequate. Although the insertion of a balloon catheter obtains an accurate assessment of the bladder volume (Fig. 1D), catheterization may cause ADL levels to decline, delirium, discomfort and increase the risk of infection.

Bladder volume scanning negates the need for catheterization.

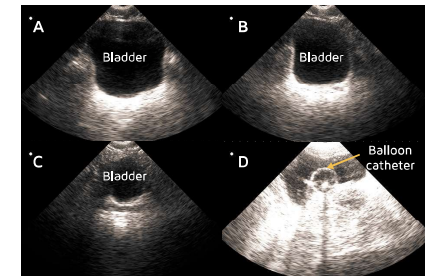


Fig. 1A/B/C : Varying bladder volumes
Fig. 1D : Balloon catheter in the bladder

Lung Scanning : Assessing for lung congestion

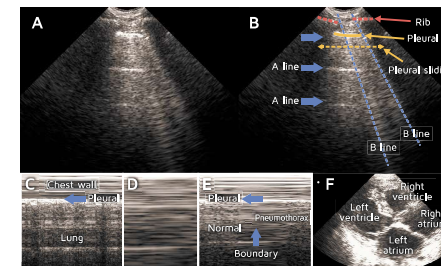


Fig. 2A/B : B-mode lung image
Fig. 2C/D/E : M-mode lung image, 'Seashore' (normal), 'Barcode' (pneumothorax), 'Lung point'

Fig. 2F : 4 Chamber heart (subxiphoid view)

Lung ultrasounds are easy to perform and have become part of the patient assessment especially in emergency medicine. The transducer is placed intercostally and the entire lung is assessed in different intercostal spaces. The SONIMAGE P3 allows lung assessment in B-mode and M-mode. Normal lung (Fig. 2A/B) is demonstrated by the presence of pleural sliding in B-Mode and the Sea-shore sign in M-mode (Fig. 2C).

Pneumothorax is identified by the absence of pleural sliding and the presence of the Barcode sign in M-mode (Fig. 2D). Pulmonary edema is assessed using the presence of 3 or more B-lines in B-mode images (Fig. 2B).

The SONIMAGE P3 is able to assess the heart for cardiac contractions and pericardial effusions. The shape of the transducer makes it ideal to scan lungs intercostally even on a lean elderly patient.

Jugular vein Scanning : Assessing intravascular volume

In order to assess intravascular volume the Inferior Vena Cava (IVC) is often scanned (Fig. 3D). This can be challenging for ultrasound beginners and often the jugular vein is scanned instead of the IVC. If the jugular vein is dilated (Fig. 3C) while seated it is possible the patient has right side heart failure.

In this particular case the diameter of the jugular vein changed with respiration suggesting moderate, not severe right side heart failure. The SONIMAGE P3 transducer scans from 1-18 cm making visualisation of the IVC and jugular veins possible. PW Doppler can assist in identifying veins and arteries (Fig. 3E).

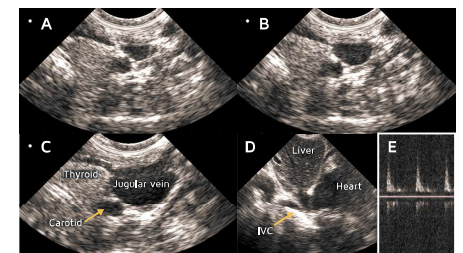


Fig. 3A/B/C : Varying jugular vein
Fig. 3D : Inferior Vena Cava (IVC)
Fig. 3E : PW artery Doppler