

## The Sonographer Sound-Off Editorial: Volume 1



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I would like to take a few minutes to reach out and connect with the great many sonographers who have contributed to making CASE the successful educational product it has become. Your contributions to the Journal should not be overlooked. You are recognized as successful authors and have published many great reports as the first, last, and corresponding author. You are often *acknowledged* for your important role in the published manuscript, even when not included as a contributing author. You are an essential part of the peer-review process and have reviewed many reports. In doing so, you provide the editorial review board with your significant perspective on the image acquisition, image displays, and other relevant components to the manuscript that may go unchecked. You have also sent us many wonderful echocardiographic figures and videos to highlight your unique skills, input, and expertise using the CASE Homepage tools such as *Unlock the CASE* and *Sonographer Sound-Off*. Thank you for all the ways you are a major contributor to CASE!

If you are unfamiliar with the *Sonographer Sound-Off* (SSO) feature, the following is a short summary about that opportunity. Incorporating the vision of your sonographer CASE leaders (Bonita Anderson, Carol Mitchell, and Karen Zimmerman), the SSO option was established as a mechanism for sonographers to participate in the publication process in addition to submitting a case report. Usually starting with a simple question combined with an initial image to engage the reader, often something that is either uniquely acquired or has an atypical appearance, the sonographer then provides their mental gymnastics that lead to the discovery of some hidden pathology or reveal some ingenious, untaught sonographer talent. Additional images are allowed and encouraged to complete the SSO, and in total, this forum allows you to teach your peer sonographers across the globe something that you felt was meaningful and should be disseminated widely. Not only is there no Article Processing Charge or other cost associated with this online presentation, but we will send you an ASE Guideline Poster and recognize you for your successful contribution on the CASE homepage, social media, and in the ASE member newsletter. This SSO option allows the inexperienced sonographer to participate in the publication process as they hone their skills and interests to possibly one day provide a complete manuscript to CASE. This SSO option is also a good fit for the more experienced sonographer who simply has unique insights they want to quickly disseminate. The SSO details and archive can be found on the [CASE Homepage](#).

As another method to recognize the wonderful contributions of our sonographers, I will now address some of the many insightful questions that have come my way during my time as CASE Editor-in-Chief (NOTE: *answers are from the perspective of this individual and may not represent the exact views of ASE, CASE, or Elsevier*). Thanks

to all of the sonographers who submitted these incredibly insightful (often difficult) questions. I apologize that there were too many to answer them all during this editorial, but I look forward to providing another sonographer-focused issue again in the near future. Please keep sending us your questions; you can email clinical questions to me at [case4ase@gmail.com](mailto:case4ase@gmail.com). Email Andie Piddington ([apiddington@asecho.org](mailto:apiddington@asecho.org)), CASE Deputy Managing Editor, with your questions about submitting to CASE or becoming a reviewer.

**Q.** What is the difference between Grade 3 and Grade 4 diastolic dysfunction? (Kristin Rash, RDCS: 3 years' experience)

**A.** Simply stated, both of these are bad and represent the worst grade of diastolic function (e.g. *restrictive* physiology). Neither is commonly used in today's reporting schemes since we now more typically report the estimated LAP instead of the 'grade.' Grade 3 is considered 'reversible' restrictive, whereas grade 4 is 'fixed' restrictive. This categorization was determined with serial Doppler (e.g. after treatment for heart failure was initiated or optimized) or during Doppler acquisition at the time of a Valsalva maneuver (e.g. grade 4 [*fixed*] remains unchanged with Valsalva; grade 3 [*reversible*] changes from 'restrictive' filling pattern to either a grade 2 or grade 1 filling pattern). This was proposed as a method to identify the poorest prognosis in patients with HF<sub>r</sub>EF which is the fixed, grade 4 pattern. I'm proud to tell you that my current colleague and recent ASE Richard Popp Teaching Award winner (Dr. Mikel D. Smith) and my current Endowed Chair Title (Dr. Anthony N. DeMaria) were the authors on this sentinel work.<sup>1</sup>

**Q.** What is the number 1 factor that determines if a patient is in cardiac tamponade, recognizing that we have so many different echo parameters that we look at and report? I'm not sure which one of those is the key finding? (Aleada Carver, RDCS: 5 years' experience)

**A.** Similar to most conclusions we make with echocardiography, there is a requirement for multiple echo parameters combined with clinical judgement since, unfortunately, there are rarely definitive or overwhelmingly convincing single parameters that can be universally relied upon on. For tamponade, I usually comment that this is a continuum, rather than a finding that is either *present* or *not present*. I look for IVC plethora as a highly sensitive feature of tamponade. This means that it would be rare (<5% of cases) to have a normal collapsing IVC in the setting of tamponade. The size of the pericardial effusion and the presence of diastolic RA or RV chamber collapse are highly variable features of tamponade. The duration (e.g. extending into late diastole) of the chamber 'collapse' is more important than simply the occurrence in *early* diastole. Finally, respiratory variation is another variable finding in tamponade. In my clinical experience, respiratory variation of the Doppler E-wave progresses from initially being seen across the tricuspid valve only (E wave increase > 40-50% with inspiration), then involves the mitral valve (E wave decrease > 25-30% with inspiration), and when the most clinically significant tamponade exists, the LVOT flow will vary (reduced VTI with inspiration). When only 1 of these features is present, I report phase I (early) tamponade. As more features are seen, I will report phase II (intermediate) or phase III (hemodynamically significant) tamponade (e.g. phase III tamponade is a critical finding).<sup>2</sup> Check out the

[ASE expert consensus statement](#) for imaging of patients with pericardial diseases for additional reading on this topic.<sup>3</sup>

**Q.** Regarding agitated saline bubble studies, is it more important to have a clear image or a correct axis? Since subcostal 4CV is optimal for septal shunt detection with color flow Doppler, can we use this view for bubble studies? When is it best to perform the Valsalva maneuver? After or before the bubbles appear in the RA? (Ellen Hunsaker, RDCS: 31 years' experience)

**A.** Hey. I think that was three questions! But, these are very insightful questions on a relatively common component of our daily practice. Let me start by saying there is limited evidence-based research to guide my answers. In fact, I think the answers to your questions will vary based upon clinical indications and you should always coordinate your study approach by communicating directly with your assigned echo reader. In general, image alignment is less important than a quality image to detect cardiac shunting (e.g. seeing *bubbles* where they don't belong). Your insight regarding the subcostal view is excellent. Since that view provides direct perpendicular flow from a left-to-right atrial-level shunt, it is recognized as a critically important congenital view. During bubble studies, this may also be the best view to document the 'negative' contrast at this same location. However, since usually you are seeking right-to-left atrial-level shunts, it is important to have high quality images of the left heart (and for that, the subcostal window may not be the best option). Once you have an optimal quality image, the coordination between image acquisition and right atrial opacification during Valsalva release begins, and takes practice. We ask our sonographers to watch for the atrial septum to bulge leftward to confirm the goal of the Valsalva maneuver was met. The timing of the Valsalva instructions to the patient versus image acquisition will also vary based upon heart pathology (e.g. longer delays between instructions and imaging if a low cardiac output or ventricular [especially right] dysfunction; shorter delays in higher output states). The goal is to have maximal RA opacification at the time of the atrial septal leftward bulge since a PFO will shunt with a short bolus of bubbles immediately after this. My recommendation is to acquire this using 'retrospective capture' (instead of the typical 'prospective capture') to allow you to record the previous 10-20 beats. All you have to do is *hit acquire once you see a shunt (or you see the septal shift, but no shunt)*. Retrospective capture then allows you to scroll back to the frame immediately prior to your chosen image and acquire the most relevant cardiac cycles.

**Q.** How do we get upper-level management to make the changes necessary to reduce repetitive strain injury in the field of sonography? (Niki McKibben, RDCS, Lead Sonographer: 10 years' experience)

**A.** An excellent question. In 2021, the ASE Board of Directors, which included me at that time, approved a policy titled: [ASE Statement on Prevention of Work-Related Musculoskeletal Disorders \(WRMSD\)](#). That document addressed the importance of employers to actively "contribute to a safe environment by designing lab workflow to include breaks between scans, rotating shifts to reduce repetitive scanning patterns, limiting portable bedside exams, and providing ergonomic equipment." I think you can (and should) present this ASE position to your leadership. That document also importantly recognized that sonographers are "responsible for practicing good ergonomics when scanning, using available ergonomic equipment, and actively engaging in exercises (i.e. stretches) before and after exams to decrease the risk for WRMSDs." As a cardiac sonographer, you need to actively participate in a lifestyle that helps you maintain a long career. Here is an [illustrated list of exercises](#) proven to help reduce WRMSD<sup>4</sup> and a wonderful overview on this topic in the [Echo Magazine](#).

**Q.** How does a sonographer feel confident that global longitudinal strain (GLS) is being performed correctly? (Brenda Campbell, RDCS: 10 years' experience)

**A.** Another wonderful question. I would suggest you work closely with your physician readers and ultrasound industry representatives to develop your skills on quality assurance (QA) steps for GLS acquisition and reporting. Each ultrasound vendor and platform version will vary slightly which may impact these QA steps. In general, you want to acquire the highest quality 2D images and then let the system automate the endocardial contours. Your QA should involve confirming the selection of the mitral valve (LV base) points and the apex and then reviewing the segmental lines and bullseye. It is essential that you are consistent and repeatable in your approach so that the variations seen serially reflect the patient and not the procedure.

**Q.** Is 3D-RTE or 2D-biplane Simpson more accurate to obtain LVEF and which one is preferred when we are creating our sonographer worksheets? (Jordan Earlywine, RDCS: 1 year's experience)

**A.** I would request you read this [review](#) on the general topic of LVEF since there is no gold standard.<sup>5</sup> In the absence of a "gold" standard (e.g. a real, measurable, undeniable LVEF), we need to instead focus on a reproducible measure that closely matches the most reliable "reference" standard (e.g. cardiovascular MRI). With high quality images, you would most likely get the same (or similar;  $\pm 5\%$ ) LVEF with 2D-biplane Simpson method that you would get with 3DE. This is especially true in patients with normal ( $\geq 53\%$ ) or severely reduced ( $< 30\%$ ) LVEF values. Patients with intermediate (30-52%) LVEF values will always have greater variability in reporting. With poor quality images, you would likely have significant variability between any method you use to measure the LVEF, regardless of the value. So, recognizing there is no perfect measure and that quality impacts your results, I think you should use the tool you have the most experience with. Use ultrasound enhancing agents liberally to improve your endocardial definition. And finally, only report the value you have confirmed to be the most reliable and avoid reporting multiple conflicting values from the various echo parameters you obtained. And never, ever, ever report a 1-dimensional LVEF value that some older ultrasound platforms may still default into the echo report.

In this issue of the Journal, there are multiple reports that indirectly answer some of these sonographer-submitted queries while offering sonographers many additional educationally meaningful insights. [Nooli et al.](#) include outstanding 3D images of the rare combination of aortic and pulmonary artery acute intimal dissections. Their report includes a review of the published literature which helped to establish their mechanistic insights. [Damito et al.](#) reported on a patient with iliac stent migration that they believe occurred late after placement. They discuss reasons for migration as well as image-guided clinical assessment as a means to guide treatment. In one of the more impressive echocardiographic videos, [Moshman et al.](#) provide us with their report on a patient with a sinus of Valsalva aneurysm that was grossly prolapsing into the LVOT and creating an unusual etiology for aortic regurgitation. I have not previously seen an image like it; be sure to check it out. Using fetal echo, [Sourour et al.](#) discovered the rare finding of absent pulmonary valve in a patient with tricuspid atresia. As an adult cardiologist, I find it simply amazing to bear witness to the current capabilities of fetal echocardiography, recognizing what this technology must overcome (e.g. rapid heart rates, patient positioning, patient movements, maternal discomfort, and very small anatomy requiring high frequency ultrasound mixed with the need for penetration and a low frequency transmission).

CASE continues to receive many outstanding reports of cardiac masses and this issue was no different (see this [recent editorial](#) for details regarding CASE submissions with cardiac masses). Demonstrating a very rare cause for a stroke, [Messiha et al.](#) discussed their patient who was found to have a thrombus on the subvalvular

aspect of the mitral valve. Frederiksen *et al.* described two very different clinical presentations of Loeffler endocarditis and included an excellent discussion regarding the role of multimodality imaging. Lastly, in the hemodynamic corner, Griffin *et al.* provide an outstanding report on the insightful negative physiologic impact of an intra-aortic balloon pump device in a patient found to have both stress cardiomyopathy as well as HCM with obstruction. They used Doppler echocardiography to provide their expert insights into the physiology of their findings.

Sonographers are a critically important component of our Society. It has been my privilege to witness the many wonderful ways that sonographers directly and favorably impact CASE. I am hopeful that sonographers find the answers to many of their burning questions by reading over these monthly CASE issues. However, feel free to [submit your burning questions](#) to us and then watch for those to be answered in Volume 2 of a future Sonographer Sound-Off Editorial.

*Remember, every echo you see today has a teaching point; and every teaching point is a potential new CASE report!*

## REFERENCES

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1. Xie GY, Berk MR, Smith MD, Gurley JC, DeMaria AN. Prognostic value of Doppler transmitral flow patterns in patients with congestive heart failure. *J Am Coll Cardiol* 1994;24:132-9.
2. Patel AR, Sugeng L, Lin BA, Smith MD, Sorrell VL. Communication and documentation of critical results from the Echocardiography Laboratory: a call to action. *J Am Soc Echocardiogr* 2018;31:743-5.
3. Klein AL, Abbara S, Agler DA, Appleton CP, Asher CR, Hoit B, et al. American Society of Echocardiography clinical recommendations for multimodality cardiovascular imaging of patients with pericardial disease: endorsed by the Society for Cardiovascular Magnetic Resonance and Society of Cardiovascular Computed Tomography. *J Am Soc Echocardiogr* 2013;26:965-101215.
4. Bourque DP. Injury prevention for sonographers. *J Am Soc Echocardiogr* 2015;28:A19-21.
5. Sorrell VL, Kotter J, Anaya P. What the EF is going on here? *J Am Soc Echocardiogr* 2020;33:812-4.

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