Image Quality Scoring System

Subcostal cardiac view quality assessment | 6 cardinal elements | 12-point scale

Overview

This scoring system provides a standardized method for evaluating image quality of the **subcostal cardiac (subxiphoid 4-chamber) view** — the cornerstone of the EASy examination. Six cardinal elements are each scored 0-2 for a maximum of 12 points. The system is derived from the EASy multicenter validation study (Bughrara et al. 2018) which classified image quality as **good** (61%), **adequate** (21%), **poor** (7%), or **unable to obtain** (11%) in 150 prospective examinations.

Six Cardinal Elements — Subcostal Cardiac View

#	Element	Score 2 (Good)	Score 1 (Adequate)	Score 0 (Poor / Absent)
1	**Pericardium**	Pericardial space clearly visualized around the heart; can confidently rule in or rule out effusion	Pericardium partially visualized; some regions obscured but assessment still possible	Pericardium cannot be assessed; unable to evaluate for effusion
2	**RV Size**	RV cavity well delineated; RV:LV ratio can be confidently estimated (normal or enlarged)	RV partially visible; qualitative size assessment possible but additional views may help	RV not visualized or too poorly defined to assess cavity size
3	**RV Function**	RV free wall motion clearly seen; can assess contractility and tricuspid annular motion	RV function partially assessable; suboptimal visualization but gross dysfunction identifiable	RV function cannot be assessed; free wall motion not visualized
4	**Interventricular Septum**	IVS clearly visualized throughout cardiac cycle; can assess motion, thickness, and septal shift	IVS partially visible; can identify gross abnormalities (septal shift) but fine detail limited	IVS not visualized; cannot assess septal motion or morphology
5	**LV Size**	LV cavity well delineated; can confidently assess for dilation or small cavity	LV partially visible; qualitative size estimate possible but less reliable	LV not visualized or too poorly defined to assess cavity size
6	**LV Function**	LV wall motion clearly seen; can assess global contractility (hyperdynamic / normal / reduced)	LV function partially assessable; can identify severe dysfunction but subtle changes missed	LV function cannot be assessed; wall motion not visualized

Score Interpretation

Score	Quality Rating	Clinical Interpretation	Action
10-12	**Good**	Diagnostic quality — all six cardinal elements clearly visualized; suitable for hemodynamic phenotyping	No repeat needed; proceed with clinical decision-making
7-9	**Adequate**	Usable image — most elements assessable; may have minor limitations in 1-2 elements	Acceptable for clinical use; note specific limitations
4-6	**Poor**	Suboptimal — several elements poorly visualized; diagnostic confidence limited	Consider repeat with optimized technique
0-3	**Unable to Obtain**	Non-diagnostic — insufficient visualization of cardinal elements for reliable assessment	Repeat exam required or use alternative imaging

Quality tiers correspond to the classification used in Bughrara et al. (ASA 2018): good 61%, adequate 21%, poor 7%, unable to obtain 11% (n=150 prospective exams).

Optimization Tips for the Subcostal Cardiac View

• **Probe position** — Place 2 cm below the xiphoid process; use an overhand grip and flatten the probe against the abdomen. Use the liver as an acoustic window.

• **Probe pressure** — Firm, steady pressure is often required. Trap a small skin fold beneath the probe to maintain contact. Ask the patient to bend their knees to relax the rectus muscles.

• **Depth** — Start at 15-20 cm; the heart should fill approximately two-thirds of the screen. Reduce depth once all four chambers are in view.

• **Gain** — Blood should appear black, myocardium gray. Adjust TGC (time-gain compensation) so near and far field are balanced.

• **Angle toward the heart** — Tilt the tail of the probe caudally and aim toward the patient's left shoulder. Small adjustments in angle make large differences in subcostal imaging.

• **Patient factors** — Body habitus, surgical dressings, and bowel gas are common barriers. Semi-recumbent positioning or slight left lateral tilt may improve the window.

Common Pitfalls

• **Mistaking RV for LV** — In the subcostal 4-chamber view, the RV is the chamber closest to the probe (anterior). Confirm with the moderator band and trabeculations.

• **Foreshortened view** — If the apex is not visualized, the probe is not angled enough toward the left shoulder. A foreshortened view underestimates chamber sizes and wall motion.

• **Excessive probe movement** — Subtle rocking (not sliding) is the key to optimization. Large movements lose the window entirely.

• **Inadequate clip length** — Capture at least 3 complete cardiac cycles per clip. Short clips prevent reliable assessment of wall motion and function.

• **Ignoring the pericardium** — Scan circumferentially around the heart. A small posterior effusion can be missed if only the anterior pericardium is assessed.

Quick Score Sheet

Score each element 0-2, then sum for total.

Element	Pericardium	RV Size	RV Function	IVS	LV Size	LV Function	Total
Score (0-2)							/ 12

Quality Rating:	10-12 = Good	7-9 = Adequate	4-6 = Poor	0-3 = Unable to Obtain

Reference: Bughrara et al. *ASA Abstract A3089* 2018; Bughrara et al. *Can J Anaesth* 2022; Bughrara et al. *Crit Care Explor* 2024; Howell-Clark et al. *JoVE* 2025 | easypocus.net