

Table 1. ACC/AHA 2015 GL on ACHD. Recommendations for atrial septal defect.

Diagnostic

In adults with an unrepaired ASD, CMR imaging, transesophageal echocardiography, or cardiac CT is recommended to define defect size, morphology, rim anatomy, and pulmonary venous connections.	1 B-NR
Adults with an unrepaired ASD and PAH should undergo risk assessment and management in consultation with pulmonary hypertension specialists to improve outcomes.	1 B-NR
Adults with an unrepaired ASD should be assessed for the presence of PAH to guide medical therapy and determine suitability for repair.	1 C-EO
In adults with an unrepaired ASD, balloon test occlusion before closure may be reasonable to assess hemodynamic changes.	2b C-LD

Routine Follow-Up and Testing Intervals

Type of Follow-Up or Testing	Physiological Stage A* (mo)	Physiological Stage B* (mo)	Physiological Stage C* (mo)	Physiological Stage D* (mo)
Outpatient ACHD cardiologist	36-60	12-24	6-12	3-6
Electrocardiogram	36-60	12-24	12	12
Transthoracic echocardiogram	36-60	12-24	12	12

Table 2. ACC/AHA 2025 GL on ACHD. Recommendations for atrial septal defect.

Therapeutic

In adults with an unrepaired ASD, significant left-to-right shunt ($Q_p:Q_s \geq 1.5$) and right ventricular (RV) dilation, in the absence of PAH ($PVR \leq 2$ Wood units) or significant LV disease,* ASD closure is recommended to improve functional class and clinical outcomes.	1 B-R
In adults with an isolated unrepaired secundum ASD, transcatheter closure is usually preferred to surgical repair to reduce length of stay and recovery time.	1 B-NR
In adults with an unrepaired ASD and evidence of (or strong suspicion for) paradoxical embolism, ASD closure is recommended to prevent recurrent embolism.	1 C-EO
In adults with an unrepaired ASD, significant left-to-right shunt ($Q_p:Q_s \geq 1.5$) and RV dilation, with a $PVR > 2$ to < 5 Wood units, and without significant LV disease,* ASD closure is reasonable to improve functional status.	2a B-R

In adults with an unrepaired ASD, significant left-to-right shunt ($Q_p: Q_s \geq 1.5$), RV dilation, PAH (PVR 5 to 8 Wood units), and without significant LV disease, closure can be beneficial if PVR <5 Wood units can be achieved with targeted PAH therapy, to improve medium-term functional status. 2a B-NR

In adults with an unrepaired ASD and PAH for whom closure is indicated, fenestrated repair can be considered to improve functional class and clinical outcomes. 2b B-NR

In adults with unrepaired superior sinus venosus atrial septal defect (SVASD), transcatheter closure (when technically feasible) may be a reasonable alternative to surgery to reduce operative morbidity. 2b B-NR

In adults with an unrepaired ASD, significant left-to-right shunt ($Q_p: Q_s \geq 1.5$), and PAH with PVR of 5 to 8 Wood units while receiving targeted PAH therapy, the usefulness of fenestrated ASD closure to improve functional class and clinical outcomes is uncertain. 2b B-NR

In adults with an unrepaired ASD and Eisenmenger physiology, ASD closure should not be performed to avoid increasing morbidity and mortality. 3 Harm C-LD

*Significant LV disease: any condition resulting in chronically elevated left atrial pressure ≥ 15 mm Hg.

TABLE 3. ESC 2020 GL on ACHD. Recommendations for intervention in atrial septal defect (native and residual)

ASD closure regardless of symptoms in patients with evidence of RV volume overload ^a and no PAH (no non-invasive signs of PAP elevation or invasive confirmation of PVR <3 WU in case of such signs) or LV disease.	I B
Device closure as the method of choice for secundum ASD closure when technically suitable.	I C
In elderly patients not suitable for device closure, carefully weigh the surgical risk against the potential benefit of ASD closure.	I C
Invasive measurement of PVR is mandatory in patients with non-invasive signs of PAP elevation	I C
In patients with LV disease, perform balloon testing and carefully weigh the benefit of eliminating L_R shunt against the potential negative impact of ASD closure on outcome due to an increase in filling pressure (taking closure, fenestrated closure, and no closure into consideration).	I C
ASD closure in patients with suspicion of paradoxical embolism (exclusion of other causes), regardless of size providing there is absence of PAH and LV disease.	IIa C
In patients with PVR 3-5 WU, ASD closure when significant L-R shunt is present (Qp:Qs >1.5).	IIa C
In patients with PVR > 5 WU, fenestrated ASD closure when PVR falls below 5WU after targeted PAH treatment and significant L_R shunt is present (Qp:Qs >1.5).	IIb C
ASD closure is not recommended in patients with Eisenmenger physiology, patients with PAH and PVR > 5 WU despite targeted PAH treatment, or desaturation on exercise. ^b	III C

ASD = atrial septal defect; L_R = left-to-right; LV = left ventricle/ventricular; PAH = pulmonary arterial hypertension; PAP = pulmonary artery pressure; PVR = pulmonary vascular resistance; Qp:Qs = pulmonary to systemic flow ratio; RV = right ventricle/ventricular; WU = Wood units.

a RV enlargement with increased stroke volume.

b There are limited data available for a precise cut-off, but by clinical experience, this would be given by a fall of arterial oxygen saturation <90%.

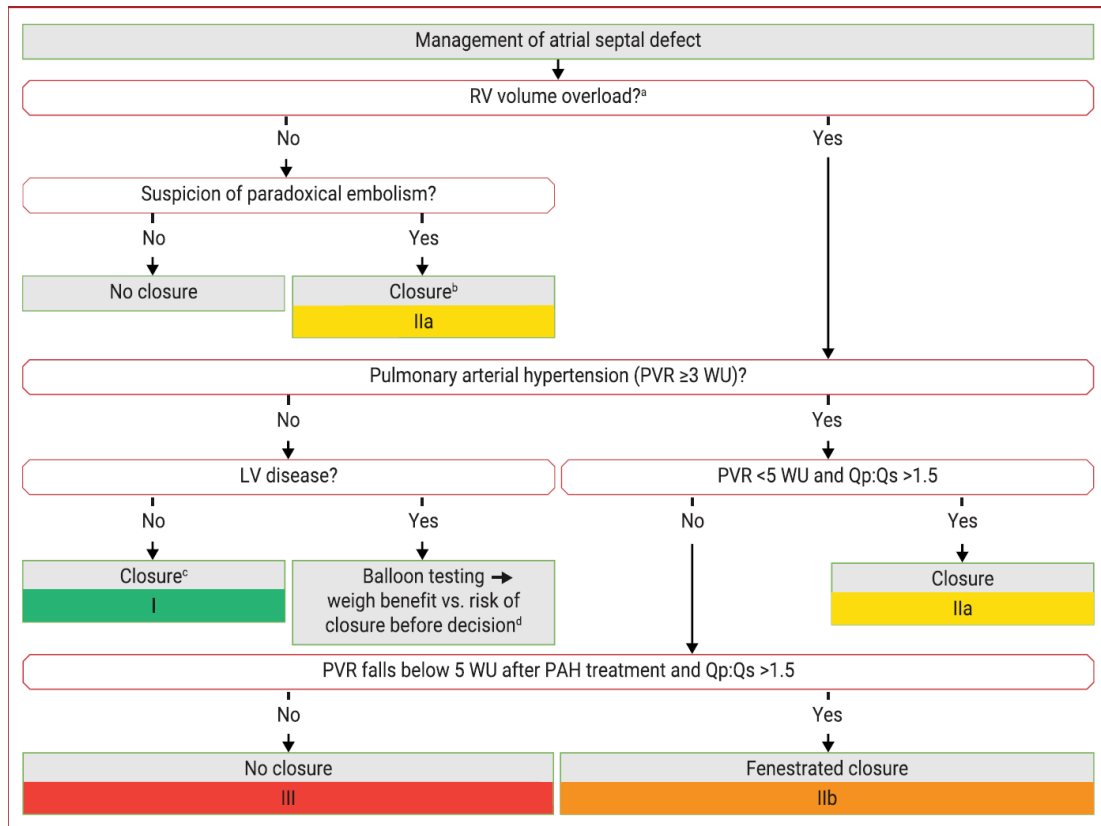


Figure 1. ESC 2020 GL on ACHD Management of atrial septal defect.

ASD = atrial septal defect; L-R = left-to-right; LV = left ventricle/ventricular; PAH = pulmonary arterial hypertension; PVR = pulmonary vascular resistance; Qp:Qs = pulmonary to systemic flow ratio; RV = right ventricle/ventricular; WU=Wood units.

a RV enlargement with increased stroke volume.

b Providing there is no PAH or LV disease.

c In elderly patients not suitable for device closure, carefully weigh surgical risk vs. potential benefit of ASD closure.

d Carefully weigh the benefit of eliminating L_R shunt against the potential negative impact of ASD closure on outcome due to an increase in filling pressure (taking closure, fenestrated closure, and no closure into consideration).

Closure Considerations for Secundum Atrial Septal Defect

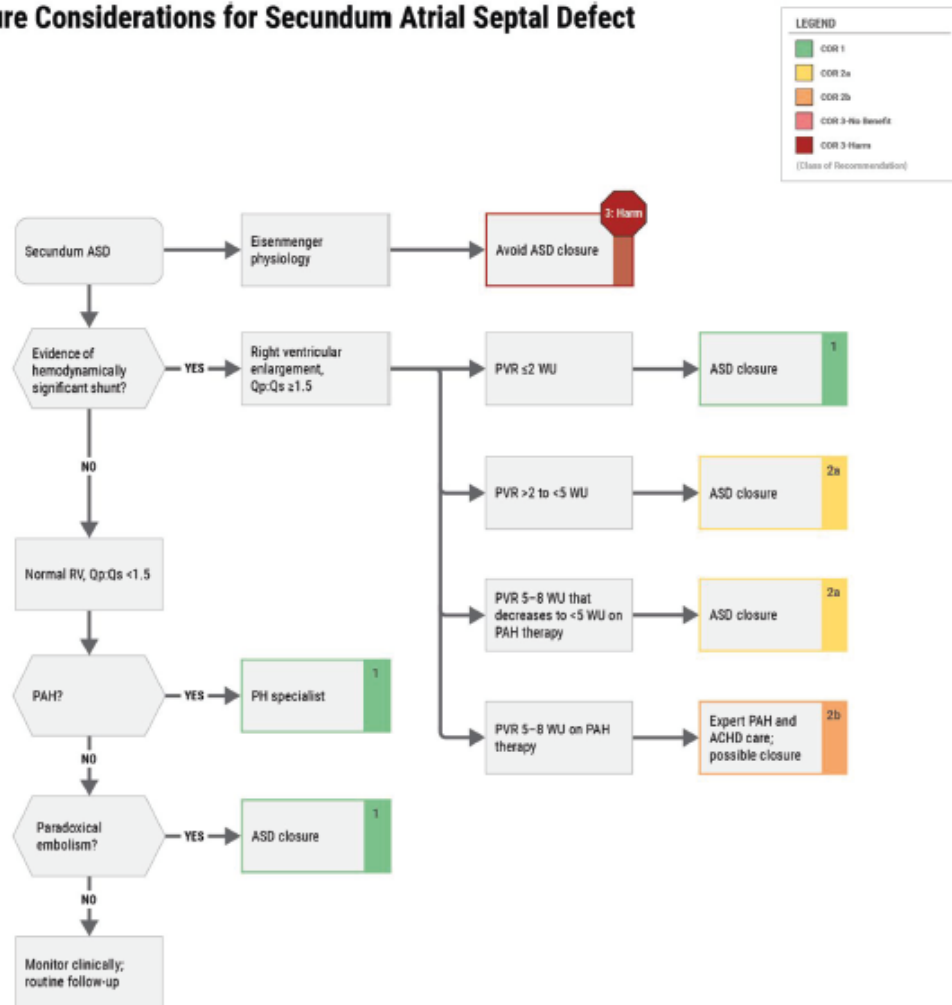


Figure 2. ACC/AHA 2015 GL on ACHD. Closure Considerations for Secundum Atrial Septal Defect.

All ASD closure recommendations assume the patient has no evidence of significant left heart disease.

*Therapy, PAH-directed medical therapy.

ACHD indicates adult congenital heart disease; ASD, atrial septal defect; PAH, pulmonary arterial hypertension; PH, pulmonary hypertension; PVR, pulmonary vascular resistance; Qp:Qs, pulmonary-to-systemic blood flow ratio; RV, right ventricle; and WU, Wood units.

Table 4. ESC 2025 GL on Pregnancy.

ACHD	Maternal Risk	Obstetric and foetal risk	Monitoring	Pregnancy management and delivery
ASD	- Low risk in (un)repaired ASD (if no PAH)⁴⁵⁷ - Unrepaired ASD: ↑ Risk of arrhythmia (4%)⁴⁵⁷ - Paradoxical embolism (2%–5%)^{457,458}	- Rare⁴⁵⁷ - Unrepaired ASD^{457,458}: - SGA (21%) - Foetal/perinatal mortality (2%–3%) - Pre-eclampsia (7%)	Unrepaired and uncomplicated ASD: consider TTE at 28–32 weeks ⁴⁵⁷	- Large and/or haemodynamically significant ASD: closure pre-pregnancy²¹ - Unrepaired ASD: - Consider ASA or prophylactic LMWH^d for paradoxical embolism prevention - Consider device closure in pregnancy only for recurrent stroke on medical therapy

Table 5. AHA/ASA 2014 GL for the prevention of stroke. Recommendations for patients with PFO.

There are insufficient data to establish whether anticoagulation is equivalent or superior to aspirin for secondary stroke prevention in patients with PFO.	IIb-B
Antiplatelet therapy for patients with an ischaemic stroke or TIA and a PFO who are not undergoing anticoagulation therapy.	I-B
For ischaemic stroke or TIA and both a PFO and a venous source of embolism, anticoagulation is indicated, depending on stroke characteristics.	I-A
Inferior vena cava filter when anticoagulation is contraindicated.	IIa-C
For cryptogenic ischaemic stroke or TIA and a PFO without evidence for DVT, available data do not support a benefit for PFO closure.	III-A
In the setting of PFO and DVT, PFO closure by a transcatheter device might be considered, depending on the risk of recurrent DVT.	IIb-C