

Supplementary Table 1. Preoperative characteristics of patients with antemortem diagnosis

Author	Year	Patient's age (year)	Gender	Clinical presentation	Diagnostic method	Additional defect
1.Balasundaram [29]	1992	21	F	Palpitasyon, dispnea, moderate exertion	Echo	ASD
2.Paniagua [3]	2000	59	F	Palpitation, heart block	Echo, MRI	None
3.Kaminishi [5]	2002	66	F	Palpitation, exertional dispnea, heart block	Echo, TEE, CT	None
4.Nojima [32]	2003	45	F	Asymptomatic, first degree AV block	Echo, MRI	None
5.Saito [4]	2005	45	F	Palpitation, first degree AV block	Echo, CT, MRI	None
6.Tran [8]	2009	42	F	Syncope, first degree AV block, mass in RA, yellowish discharge form central catheter	Echo, MRI	Mitral valve prolapse, ASD, suspected RA mixoma
7.Guo [21]	2009	41	F	Palpitation, dispnea on effort, 3rd degree AV block	Echo	None
8.Sharma [6]	2010	19	F	Orthopnea, chest pain, shortness of breath, 2nd degree heart block, secondary postpartum CHF	Echo	Previously inserted pacemaker due to congenital heart block at the age of 12
9.Talarico [1]	2011	33	M	Palpitation	Echo, coronary angiography	None
10.Alrashidi [28]	2011	42	M	Complete heart block	Echo, TEE, contrast imagining	None
11.Law [12]	2012	33	F	Congenital heart block	Echo, TEE	Subarterial VSD
		29	F	Wolf-Parkinson-White syndrome	TEE, MRI	ASD
12.Careddu [13]	2013	43	F	Dispnea, first degree AV block	Echo, TEE	None
13.Fukui [25]	2014	57	F	First degree AV block	Echo, CT, MRI	None
14.Suzuki [33]	2014	61	F	Incidental diagnose	Echo, CT, MRI	None
15.Leiballi [1]	2014	54	M	Paroxysmal palpitation	Echo, CT, MRI	Unknown
16.Zhang [1]	2015	41	F	Palpitation, dizziness	Echo, CT	Unknown
17.Ueda [34]	2016	58	F	Palpitation, first degree AV block	ECG, Echo, MRI, coronary angiography, electrophysiologic study	None
18.Li [35]	2018	41	F	Palpitation, dizziness, 3rd degree AV block	Echo, CT	None
19.Giuliano [27]	2020	71	F	Complete heart block, CHF exacerbation	TEE, CT, CT angiography, MRI	None
20.Ojha [20]	2021	55	M	Shortness of breath	Holter, echo, MRI	None
21.Velasco [36]	2022	33	F	Palpitation, fatigue, shortness of breath	ECG, echo, MRI,	None
22.Cheng [26]	2025	38	F	Incidental complete heart block	ECG, echo, MRI	None
23.Stopyra-Początek [37]	2025	64	F	Bradycardia, presyncope (Previously implanted pacemaker due to complete AV block since childhood)	Echo, TEE, CT	Moderate mitral insufficiency
24.Zgrablich [38]	2025	42	M	1st degree block	Echo, CT angiography, MRI	Mass protruding aortic non-coronary cusp

Abbreviations: Echo: Transthoracic echocardiography; ASD: Atrial septal defect; MRI: Magnetic resonance imagining; TEE: Transesophageal echocardiography; CT: Computed tomography; AV: Atrioventricular; RA: Right atrium; CHF: Congestive heart failure; VSD: Ventricular septal defect; ECG: Electrocardiogram

Supplementary Table 2. Surgical or other approaches and outcomes of patients with antemortem diagnosis

Author	Localization	Tumor size	Treatment	Permanent pacemaker	Follow up, Recurrence,
1.Balasundaram [29]	RA, Koch's triangle	0.5 cm x 0.5 cm x 0.3 cm	Complete surgical resection, ASD repair	No	Unknown (she had a pregnancy with normal delivery)
2.Paniagua [3]	RA	3 cm	Partial surgical resection	Yes	Unknown
3.Kaminishi [5]	RA, Koch's triangle	3 cm	Total surgical resection	No (First degree AV block)	1 year; alive; no recurrence
4.Nojima [32]	RA	2.7 cmx2.9 cm	Unknown	No	Unknown
5.Saito [4]	RA, Koch's triangle	3 cm	Complete surgical resection	Yes	5 years; alive; no recurrence
6.Tran [8]	RA, between coronary sinus and tricuspid anulus	2 cmx3 cm	Complete surgical resection, ASD repair	Yes	Unknown
7.Guo [21]	RA, Koch's triangle	3 cm	Complete surgical resection	Yes	2 years; alive; no recurrence
8.Sharma [6]	Diagnosed in pathological examination of explanted heart after cardiac tx	No mass appearance in sight	Heart explantation for cardiac tx	No	1 month; alive; no recurrence due to cardiac tx
9.Talarico [1]	IAS	1.2 cm	Unknown	Unknown	Unknown
10.Alrashidi [28]	RA, lower aspect of IAS	Unknown	Biopsy, medical follow up	Unknown	18 months; alive; no recurrence
11.Law [12]	RA, basal IAS	2.1 cmx2.5 cmx1.2 cm	Complete surgical resection, ASD and VSD repair, mitral and tricuspid valve repair	Yes	Unknown; unknown; unknown
	RA, Koch's triangle	0.5 cmx0.1 cm (containing fluid)	Complete surgical resection, ASD repair	Yes	Unknown; unknown; unknown
12.Careddu [13]	RA, Koch's triangle	2.5 cmx1.7 cm	Complete surgical resection with minimal invasive operation	Yes	Unknown; unknown; unknown
13.Fukui [25]	RA, widely attached to IAS	Large	Partial surgical resection to avoid complete AV block	No	1 year; alive, no recurrence
14.Suzuki [33]	RA, Koch's triangle	3 cm	Complete surgical resection	No	1 year; alive, no recurrence
15.Leiballi [1]	RA, IAS continuous with septal leaflet of the tricuspid valve	7 cmx4 cmx4 cm	Complete surgical resection	No (Complete AV block which spontaneously resolved)	1 year; alive, no recurrence
16.Zhang [1]	Lower IAS	1.5 cm×1.5 cm×1.0 cm	Surgical resection	No	1.5 years; alive, no recurrence
17.Ueda [34]	RA, Koch's triangle	1.5 cmx1.7 cm	Surgical resection, AVR, tricuspid valvuloplasty	Yes	Unknown; unknown; unknown
18.Li [35]	IAS	1.5 cmx1.5 cmx1 cm	Partial surgical resection	No	Unknown; unknown; unknown
19.Giuliano [27]	RA	3.7 cmx 2.5 cm	Yearly medical follow up due to the patient's older age (without surgery)	Previously implanted	Unknown; unknown; unknown
20.Ojha [20]	RA, IAS	1.2 cmx 1 cm	Unknown	Unknown	Unknown; unknown; unknown
21.Velasco [36]	RA, Koch's triangle	Unknown	Surgical resection	Yes	Unknown; unknown; unknown
22.Cheng [26]	RA, Koch's triangle	1.5 cmx 1.5 cm	Minimal invasive, partial surgical resection	No	Unknown; unknown; unknown
23.Stopyra-Początek [37]	RA, Koch's triangle	2.2 cmx 1.6 cm	Partial surgical resection, mitral valve repair	Increase of threshold of current pacemaker	6 months; alive; no recurrence
24.Zgrablich [38]	IVS, near righth coronary cusp of aortic valve	1.94 cm x 1.55 cm (CT)	Total resection, AVR,	Yes	Alive, discharged

Abbreviations: RA: Right atrium; ASD: Atrial septal defect; AV: Atrioventricular; tx: Transplantation; IAS: Interatrial septum; VSD: Ventricular septal defect; IVS: Interventricular septum; AVR: Aortic valve replacement

Supplementary Table 3. Characteristics of patients with a postmortem diagnosis

Author	Year	Patient's age (year)	Gender	Clinical presentation	Diagnostic method	Additional defect	Localization	Tumor size
1.Armstrong and Monckeberg [10,39]	1911	5.5	M	Complete heart block	Autopsy	Unknown	Unknown	Unknown
2.Armstrong [10]	1913	Same as case 1	M	Unknown	Autopsy	Unknown	Unknown	Unknown
3.Stoeckenius [10]	1919	Unknown	Unknown	Unknown	Autopsy	Unknown	Unknown	Unknown
4.Lloyd [10,39]	1929	39	F	1st degree heart block	Autopsy	Unknown	Unknown	Unknown
5.Kolatschow [10]	1933	Unknown	Unknown	Unknown	Autopsy	Unknown	Unknown	Unknown
6.De Chatel [10]	1933	Newborn	F	Unknown	Autopsy	Unknown	Unknown	Unknown
7.Perry and Rogers [10]	1934	26	F	Complete heart block	Autopsy	Unknown	Unknown	Unknown
8.Davidsohn [10]	1938	Unknown	Unknownn	Unknown	Autopsy	Unknown	Unknown	Unknown
9.Rezek [10,39]	1938	71	F	Complete heart block	Autopsy	Unknown	Unknown	Unknown
10.Mahaim [10,39]	1942	24	F	Complete heart block	Autopsy	Unknown	Unknown	Unknown
11.Sachs [10]	1945	Unknown	Unknown	Unknown	Autopsy	Unknown	Unknown	Unknown
12.Anderson [40]	1946	53	F	CHF	Autopsy	Aortic valve stenosis	RA	5x8 cm
13.Leicher [10,39]	1948	24	F	Complete heart block	Autopsy	Unknown	Unknown	Unknown
	1948	34	F	Complete heart block	Autopsy	Unknown	Unknown	Unknown
	1948	29	F	Complete heart block	Autopsy	Unknown	Unknown	Unknown
14.Rabson and Thill [10,39]	1948	29	F	Complete heart block	Autopsy	Unknown	Unknown	Unknown
15.Leighton, Hurst and Crawford [39]	1950	6 months	F	None	Autopsy	Congenital heart disease	Unknown	Unknown
16.Ovary [10,39]	1957	75	F	Complete heart block	Autopsy	Unknown	Unknown	Unknown
17.Kindred [10]	1957	Embrio	Unknown	Autopsy	Unknown	Unknown	Unknown	Unknown
18.Calzavara [10]	1958	Newborn [10] or 8 months [39]	F	Unknown	Autopsy	Unknown	Unknown	Unknown
19.Meeson and Poche [10]	1963	3 weeks	F	Unknown	Autopsy	Unknown	Unknown	Unknown
20.Morris and Johnson [10,39]	1964	86	F	1st degree heart block	Autopsy	Unknown	Unknown	Unknown
21.Rossi [10,39]	1965	78	F	Complete heart block	Autopsy	Unknown	Unknown	Unknown
22.Haraszti [10,39]	1965	8	M	Complete heart block	Autopsy	Unknown	Unknown	Unknown
23.Wolf and Bing [10,39]	1965	67	M	Complete heart block	Autopsy	Unknown	Unknown	Unknown
24.Kaminski [10]	1967	73	M	Complete heart block	Autopsy	Unknown	Unknown	Unknown
25.Barr and Pollock [10]	1968	49	F	Complete heart block	Autopsy	Unknown	Unknown	Unknown
26.Willis [41]	1968	48	F	Heart block	Autopsy	None	Medial wall of left atrium, above the IVS	2.5cmx 2cmx 0.3cm
27.Manion [39]	1970	53	F	Complete heart block	Autopsy	None	Lower portion of IAS	Multicystic, 3cm (the larger one)
28.Picoff and Peteryi [10]	1970	21	F	Complete heart block	Autopsy	Unknown	Unknown	Unknown
29.Hudson [10]	1970	Same as Rossi's case	F	Unknown	Autopsy	Unknown	Unknown	Unknown
30.Lafargue [42]	1971	48	M	Complete heart block	Autopsy	None	Localization of AV node	1.5 cm
31.Hopkinson and Newcombe [10]	1971	53	F	Unknown	Autopsy	Unknown	Unknown	Unknown
32.Sopher and Spitz [10]	1971	29	F	Unknown	Autopsy	Unknown	Unknown	Unknown
33.Fine and Morales [10]	1971	48	F	Unknown	Autopsy	Unknown	Unknown	Unknown
	1971	43	F	Unknown	Autopsy	Unknown	Unknown	Unknown
	1971	53	M	Unknown	Autopsy	Unknown	Unknown	Unknown
	1971	53	M	Unknown	Autopsy	Unknown	Unknown	Unknown
	1971	66	M	Unknown	Autopsy	Unknown	Unknown	Unknown
	1971	66	M	Unknown	Autopsy	Unknown	Unknown	Unknown
34.Manion [10,39]	1972	53 AFIP 1056884 [39]	F	Complete heart block	Autopsy	Unknown	Unknown	Unknown
	1972	23 AFIP 11 06963 [39]	F	Unknown	Autopsy	Unknown	Unknown	Unknown
	1972	11 months AFIP 1234567 [39]	M	2nd degree heart block	Autopsy	PDA, VSD	Unknown	Unknown
	1972	62 AFIP 1247011 [39]	M	Complete heart block	Autopsy	Unknown	Unknown	Unknown
	1972	69 AFIP 1287721 [39]	M	1st degree heart block	Autopsy	Unknown	Unknown	Unknown
	1972	8 AFIP 1325755 [39]	F	Unknown	Autopsy	Unknown	Unknown	Unknown
35.Lewman [43]	1972	19	F	Complete heart block (lost of consciousness since 3 years old and permanent pacemaker implantation)	Autopsy	None	Localization of AV node	0.3 cm
36.Baroldy [10]	1972	23	F	Unknown	Autopsy	Unknown	Unknown	Unknown
37.McAllister [44]	1973	1 pediatric	Unknown	Unknown	Autopsy	Unknown	Unknown	Unknown
		9 adults	Unknown	Unknown	Autopsy	Unknown	Unknown	Unknown

38.Case 6-1973 MGH [10]	1973	78	F	Unknown	Autopsy	Unknown	Unknown	Unknown
39.Ibarra-Perez [45]	1973	17	F	1st degree heart block	Autopsy following VSD closure and MVR	VSD, MI caused by VSD repair sutures	Localization of AV node	Small, microscopic size
40.Wanless [46]	1974	55	M	Bradycardia	Autopsy	Previously pacemaker implantation	Localization of AV node	1.5 cm x1.2 cm x0.3 cm
41.Bharati [22]	1976	16	F	Syncope, complete heart block	Autopsy	None	Localization of AV node	Microscopic
42.Ross [47]	1977	15	F	Sudden death	Autopsy	None	Localization of AV node	Microscopic
43.Fenoglio [10,48]	1977	Unknown 2 patients	Unknown	Unknown	Autopsy	Unknown	Unknown	Microscopic
44.James and Galkhov [10]	1977	65	F	Unknown	Autopsy	Unknown	Unknown	Unknown
45.Lie [10]	1980	25	F	Unknown	Autopsy	Unknown	Unknown	Unknown
46.Travers [10]	1980	75	F	Complete heart block	Autopsy	Previously pacemaker implantation	Localization of AV node	1.2 cmx1.3 cmx 0.5 cm
47.Thorgeirsson [16]	1983	15.5 months	M	2nd degree AV block, sudden death	Autopsy	Patent foramen ovale	Lower portion of IAS	0.4 cmx 0.3 cmx0.3 cm
48.Linder [49]	1984	62	F	Complete heart block	Autopsy	None	Localization of AV node	0.5 cmx1 cmx0.5 cm
49.Burke [9]	1990	7 months	M	Unknown	Autopsy	HLHS, mitral atresia	Unknown	Unknown
		9 months	M	Unknown	Autopsy	Pulmonary hypoplasia	Unknown	Unknown
		11 months Same patient as McAllister's	M	Unknown	Autopsy	VSD, PDA	Unknown	Unknown
		7 Same patient as Harazsti's	M	Unknown	Autopsy	None	Unknown	Unknown
		8 Same patient as McAllister's	F	Unknown	Autopsy	None	Unknown	Unknown
		15	F	Complete heart block	Autopsy	None	Unknown	Unknown
		23 Same patient as McAllister's	F	Sudden death	Autopsy	None	Unknown	Unknown
		24	M	Sudden death	Autopsy	None	Unknown	Unknown
		28	F	Complete AV block	Autopsy	None	Unknown	Unknown
		39	M	Complete AV block	Autopsy	None	Unknown	Unknown
		39	F	Sudden death	Autopsy	None	Unknown	Unknown
		43	F	Sudden death	Autopsy	None	Unknown	Unknown
		43	F	Sudden death	Autopsy	None	Unknown	Unknown
		48 Same patient as McAllister's	F	Complete AV block	Autopsy	None	Unknown	Unknown
		53 Same patient as McAllister's	F	Complete AV block	Autopsy	None	Unknown	Unknown
		69	M	AV block, PAT	Autopsy	None	Unknown	Unknown
		75 (Same patient as Travers)	F	Sudden death	Autopsy	None	Unknown	Unknown
50.Strøm and Skjorten [18]	1991	36	M	Complete AV block, sudden death	Autopsy	None, previously pacemaker implantation	Localization of AV node	1cmx 1cmx 0.4cm
51.Kawano [50]	1994	64	M	Complete AV block	Autopsy	None, previously pacemaker implantation	Localization of AV node	Microscopic
52.Munzon-Menez [51]	1995	55	F	Death due to cancer	Autopsy	None	Localization of AV node	0.9 cm
		25	F	Heart block, sudden death	Autopsy	None	Localization of AV node	1.3 cm
53.Declich [52]	1996	32	F	Syncope, complete heart block	Autopsy	None	Localization of AV node	Microscopic
54.Arai [53]	1998	95	F	Complete heart block	Autopsy	None, previously pacemaker implantation	Lower right atrium	1.8 cm x1.2 cm x0.5 cm
55.Ford [15]	1999	96	F	Multiform premature ventricular complex	Autopsy	None	Localization of AV node	Microscopic
		37	M	Heart failure	Autopsy	None	Localization of AV node	Microscopic
56.Suárez-Mier [54]	1999	18	F	None	Autopsy	None	Localization of AV node	Microscopic
		21	M	None	Autopsy	None	Localization of AV node	Microscopic
57.Agaimy [55]	2000	75	M	None	Autopsy	Aortic papiller fibroelastoma	Localization of AV node	< 1 cm
58.Cohle [56]	2002	25	F	Sudden death	Autopsy	Unknown	Unknown	Unknown
		25	F	Complete heart block, sudden death	Autopsy	Unknown	Unknown	Unknown
		21	M	Complete heart block	Autopsy	Previously pacemaker implantation	Unknown	Unknown
		6	M	None	Autopsy	None	Unknown	Unknown
59.Wong [57]	2003	13	F	Right axis deviation	Autopsy	TGA, PDA (Senning operation)	Localization of AV node	0.9 mm
60.Cameselle-Teijeiro [14]	2005	75	M	1st degree AV block, left bundle block	Autopsy	Cardiac failure	Localization of AV node	Unknown

61.Evans [7]	2005	31	M	Sudden death	Autopsy	None	Localization of AV node	1.1 cm
62.Song [58]	2007	7	M	None	Autopsy	None	Localization of AV node	0.16 cm x 0.4 cm x0.29 cm
63.Maujean [59]	2010	35	M	2nd degree AV block, syncope	Autopsy	Previously pacemaker implantation	Localization of AV node and His bundle	Microscopic
64.Pan [23]	2012	42	M	None	Autopsy	None	Localization of AV node	0.6 cm x0.8 cm
65.Oost [60]	2012	19	M	VF	Autopsy	None	Localization of AV node	2 cm
66.Kasper [61]	2012	9	F	Syncope, 3rd degree heart block	Autopsy	None	Localization of AV node	Unknown
67.Cavanaugh [19]	2013	18	M	VF	Autopsy	None	Localization of AV node	Microscopic
68.Patel [62]	2014	25	F	Congenital heart block	Autopsy	Previously pacemaker implantation	Localization of AV node	Microscopic
		60	F	Sudden death	Autopsy	None	Localization of AV node	5 mm
		40	F	Congenital heart block, VF	Autopsy	Mild-moderate MI, pacemaker	Localization of AV node	Microscopic
		43	M	Congenital complete heart block	Autopsy	Previously pacemaker implantation	Localization of AV node	Microscopic
69.Abuzeid [63]	2017	18	F	3rd degree heart block	Unknown	Pacemaker	Localization of AV node	Unknown
70.Farkašová Iannaccone [64]	2018	42	M	Sudden death	Autopsy	None	Localization of AV node	7 mm
71.Cohle [65]	2019	45	F	Sudden death	Autopsy	Previously pacemaker implantation	Localization of AV node	Microscopic
72.Ichimata [66]	2020	36	F	Sudden death	Autopsy	None	Localization of AV node	1.1 cmx0.4 cm
		76	M	Sudden death	Autopsy	Previously pacemaker implantation	Localization of AV node	1.7 cm x 0.4 cm
		45	M	Sudden death	Autopsy	1st degree block	Localization of AV node	1.1 cmx0.4 cm
73.Nogueira [67]	2024	Fetus (12 week+1 day of gestational age)	F	Spontaneous abortus	Autopsy	None	Localization of AV node	Unknown
74.Muramatsu [31]	2024	43	F	Sudden death	Autopsy	Previously pacemaker implantation	Base of IAS, near AVN	0.8 cmx 0.45 cm
		41	M	Sudden death	Autopsy	None	IVS, near AVN	1.1 cmx 0.18 cm
		28	M	Sudden death	Autopsy	None	IAS	0.46 cm x 0.38 cm
		58	F	Sudden death	Autopsy	None	IVS, near AVN	0.46 cm x 0.11 cm
		68	M	Sudden death	Autopsy	None	IAS, near AVN	0.32 cm

Abbreviation: CHF = congestive heart failure; IVS = interventricular septum; IAS = interatrial septum; AV = atrioventricular; AFIP = Armed Forces Institute of Pathology; PDA = patent ductus arteriosus; VSD = ventricular septal defect; MVR = mitral valve replacement; MI = mitral insufficiency; HPLH = hypoplastic left heart; PAT = paroxysmal atrial tachycardia; TGA = transposition of great arteries; VF = ventricular fibrillation; AVN = atrioventricular node