

Interventional catheterization in pediatric catheterization laboratories for congenital and structural heart defects during 2009–2018 in Poland. Report of the National Consultant of Pediatric Cardiology

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Over the last 20 years interventional catheterization has become the procedure of choice for the treatment of several congenital and structural heart defects (CHD). Published data of the activities of pediatric catheterization laboratories (cath labs) in Poland are limited [1–4].

A National Consultant of Pediatric Cardiology (JB) for several years has collected data from all pediatric cath labs in Poland regarding their activities. They included details of interventional procedures performed in CHD in children and adults.

There are 10 pediatric cath-lab centers in Poland (all with a department of pediatric cardiac surgery) – two in Warsaw (Instytut Pomnik Centrum Zdrowia Dziecka – CZD and Warsaw Medical University – WUM), two in Gdansk (Uniwersyteckie Centrum Kliniczne – UCK and PCT Hospital), and a single one in: Lodz – Instytut Pomnik Centrum Zdrowia Matki Polki (CZMP); Poznan – Uniwersytet Medyczny (UM); Katowice – Górnośląskie Centrum Zdrowia Dziecka (GCZD); Wrocław – Wojewódzki Szpital Specjalistyczny (WSS); Krakow – Uniwersytecki Szpital Dziecięcy (USD) and Zabrze – Śląskie Centrum Chorób Serca (SCCS). All of them reported their activities yearly from 2009 to 2018 except 2 centers; one in Katowice and another one in Gdansk (PTC) which started working in 2011. There are currently 14 operators of pediatric cath labs in Poland – most of them more than 50 years old (yo).

There were 17 054 interventional catheterizations in CHD reported in the period 2009–2018 including 2080 (12.2 %) procedures conducted in adult patients (> 18 yo) – Table I. The latter procedures were performed generally in 4 cath labs: SCCS Zabrze, UCK Gdansk, WSS Wrocław and CZMP Lodz. The number of CHD surgical

operations (in children and adults) were collected from 10 units mentioned above (having specific Pediatric cath labs) in the Polish Cardiac Surgery Registry (KROK Report – Rejestr Operacji Kardiologicznych w Polsce). They reported 93.5% of all surgical procedures performed in CHD in Poland.

The numbers of interventional procedures vs. surgical operations in CHD during the period 2009–2018 are presented in Figure 1 A. It is clear that the number of interventional catheterizations has consistently increased during that time whereas surgical procedures have remained constant. It is important to state that the number of surgical and interventional procedures in the year 2018 were similar (2293 vs. 2271). Obviously the surgical procedures were different in distinct CHD than catheter interventions, but it was not analyzed in this study.

Activities of particular Pediatric cath labs in Poland from 2009 to 2018 are presented in Figure 1 B. Four of them (CZD Warsaw, CZMP Lodz, USD Krakow, SCCS Zabrze) in the year 2018 performed more than 270 procedures. The remaining 6 cath labs performed more than 123 procedures in the year 2018. Generally all Pediatric cath labs continuously increased their activities.

Table I compares different types of interventional catheterizations performed in pediatric cath labs in Poland from 2009 to 2018 in child and adult patients. The most frequent procedures in children were patent ductus arteriosus (PDA) and atrial septal defect type II (ASD) percutaneous closure (35%). Different balloon angioplasty (BAP) and valvuloplasty (pulmonary – BPV or aortic – BAV) – constituted 23% of all pediatric procedures. BAP was conducted mostly in pulmonary arteries

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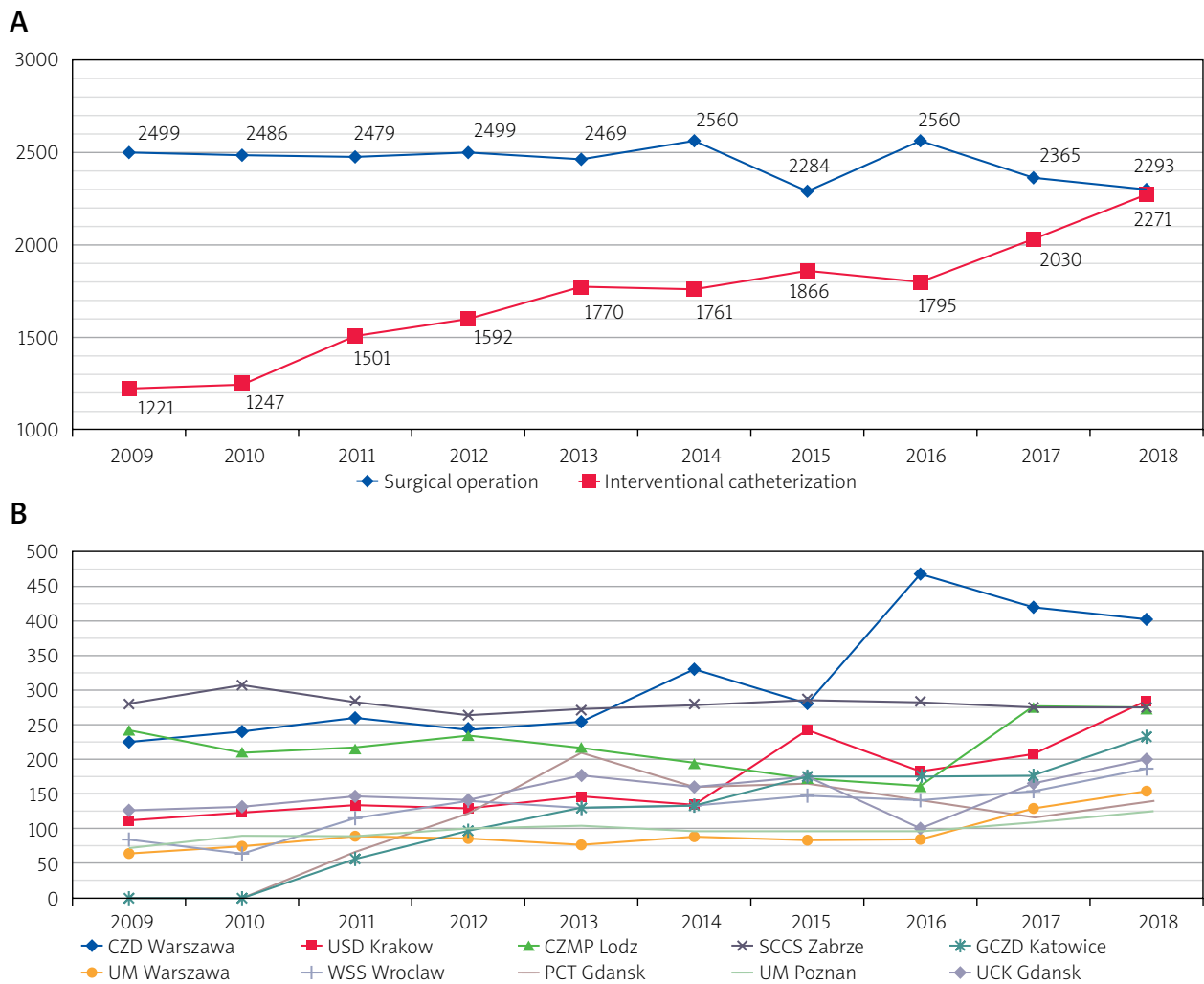


Figure 1. Interventional catheterization in pediatric cath labs in congenital heart defects in Poland performed in the years 2009–2018. **A** – interventional catheterization vs. surgical operations. **B** – Interventional procedures in particular pediatric cath lab

(PA) or coarctation/recoarctation of the aorta (CoA) and were performed at a similar rate in children. BPV was performed more often than BAV. Another frequent procedure in children was stent implantations, mainly in PA and CoA (9.2% of all interventions). The absolute number of Rashkind procedures remained stable during the analyzed decade. Patent foramen ovale (PFO) percutaneous closure was performed in only 36 children during the period of the study, reflecting the low necessity of such procedures in pediatric populations [5].

In adult patients ASD and PFO closures were the most predominant procedures (about 70% of all) – Table I. There is an important discrepancy between our findings and the AISN PTK register on ASD percutaneous closure in Poland. For example in 2017 [4] they reported 229 of such patients (not specified whether children or adults) in whom ASD was closed. In our own registry from only Pediatric cardiology cath labs there were 349 such patients (56 adults) in 2017 and 374 (76 adults) in 2018.

It is not clear if the AISN PTK registry includes pediatric cath-lab data.

In Table I “Other interventions” represented a large number of the performed procedures. They included several, different interventions: percutaneous perimembranous and muscular ventricular septal defect (VSD) closure (179 patients – 36 adults), foreign body removal from circulatory system (92 patients – 7 adults) or stent implantation in PDA (neonates), percutaneous closure of postinfarction VSD (adults), different hybrid procedures, etc. Pulmonary artery valve transcatheter implantation (PAVTI) was performed in 80 patients (23 adults). It is important to mention that our data do not include “adult” interventional centers such as the National Institute of Cardiology in Warsaw, where the majority of PAVTI were performed.

In conclusion, there was a constant significant increase in the total number of interventional procedures seen in pediatric cath labs in Poland in children and sta-

Table I. Interventional catheterization in children (P) and adults (A) in pediatric cardiology cath labs in Poland in the years 2009–2018

Variable	2009		2010		2011		2012		2013		2014		2015		2016		2017		2018	
	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A
All procedure	1018	203	1060	187	1308	193	1360	232	1550	220	1530	231	1642	224	1630	165	1855	175	2021	250
ASD closure	161	88	187	75	243	72	215	78	342	77	274	83	273	80	276	63	287	59	298	76
PFO closure	2	59	3	55	1	77	1	75	6	79	4	89	1	71	-	63	8	71	10	108
PDA closure	222	13	236	11	289	9	304	13	319	4	369	7	324	10	340	5	341	7	417	10
BAP of CoA	76	9	88	5	105	1	99	5	107	13	86	2	92	7	120	2	105	4	129	4
BAP of TP	66	4	60	6	109	2	85	6	115	3	116	6	129	12	101	6	171	1	173	8
BPV	80	9	83	-	107	2	99	2	93	11	122	7	101	1	98	-	107	2	95	1
BAV	60	-	58	-	57	2	51	-	46	2	48	-	45	1	51	1	86	1	62	-
BAS-Rashkind	99	-	87	-	116	-	96	1	127	-	86	-	102	-	110	-	146	-	111	-
Stent of TP	38	-	53	5	58	2	92	6	85	4	84	5	96	7	98	3	99	8	165	7
Stent of CoA	24	8	33	13	51	4	47	23	43	8	63	10	66	7	42	5	47	8	64	7
Others interventions	190	13	172	17	172	22	271	23	267	19	278	22	413	28	394	17	458	14	497	29

ASD – atrial septal defect type II, PFO – patent foramen ovale, PDA – patent ductus arteriosus, BAP of CoA – balloon angioplasty of coarctation/recoarctation of the aorta (CoA), BAP of TP – balloon angioplasty of the pulmonary artery (TP), BPV – balloon pulmonary valvuloplasty, BAV – balloon aortic valvuloplasty, BAS – Rashkind balloon atrioseptostomy (Rashkind procedure), others – other than above-mentioned interventional procedures in CHD.

ble numbers in adults during the last decade. The small number and older age of the interventional pediatric cardiologist in Poland are worrisome. We hope that the new European Union and Polish Ministry of Health project “Power-KID” will help to stimulate and to activate new, younger pediatric cardiologists to become interventional operators working in pediatric cath labs. Adult interventions in CHD performed by pediatric cardiologists are a good option, but depend on the organizing structure of the hospital.

A limitation of this study is the voluntary register of pediatric cath labs activities. Unfortunately, mortality and serious complications of these procedures were not analyzed, but it is a well-known fact that they are anecdotal and very rare.

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Conflict of interest

The authors declare no conflict of interest.

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