Trans-axillary Surgical Ligation Of Patent Dactus Arteriosus

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Objective : **The aim of this work is to introduce and find out the applicability of trans-axillary surgical approach in closure of PDA.**

Methods : **In 20 months, 15 patients underwent trans-axillary surgical ligation of the PDA. Two had undergone urgent and 13 elective operations. There were 4 males and 11 females. Their age ranged from 25 days to 90 months and body weight ranged from 3.7 to 23 Kg (average 10.13 Kg). The studied patients had pre and post-operative clinical assessment, routine laboratory investigations, CXR, ECG and echocardiography.**

Results : **The main indication of surgery was right ventricular failure in 27%, 13.5% of them required mechanical ventilation hours after birth, 33% with failure to thrive and 40% with recurrent chest infection. The time lapsed in surgery from skin incision to skin closure ranged from 25 to 40 minutes, average 33.47 minutes. There was no intra-operative mortality or bleeding. However, one patient 6.6% had injury to the thoracic duct intra-operatively. Thirteen patients were extubated on the operating table 86.7% and 2 patients 13.3% required mechanical ventilation for 26 & 36 hours. The under water seal drainage tube was removed in range of 12 to 24 hours (average 14.6 hours) except in the patient who developed chylothorax was removed after 8 days. The total blood loss through the under water seal container was ranged from 20 to 50 mils in average of 30 mils. There was no early wound infection, dehiscence or lung collapse. Four patients (27%) had to continue the anti-failure therapy after surgery. The range of stay in the paediatric intensive care was from 12 to 48 hours in average of 23 hours. The range of stay in the hospital from date of surgery to discharge was from 3 to 12 days in average of 5.3 days. Over 20 months of follow up, there was no early, late mortality, re-addmition to the hospital, wound infection, dehiscence or unsightly scar.**

Conclusion : **trans-axillary approach for closure of PDA is an alternative incision to the conventional surgical methods, more cosmetic, not muscle cutting and easy approach particularly in infancy.**

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Patent ductus arteriosus (PDA) is frequent congenital anomaly with left to right shunt (1). Due to its haemodynamic consequences, various methods for closure have been introduced. Indomethacin (prostaglandin synthetase inhibitor) still being used especially in neonates as medical method initiates cessation of the shunt (2). Percutaneous trans-catheter ductal closure has taken most of the PDA cases away from surgical intervention. Recent success of video-assisted thoracoscopic clipping has added a new alternative for closure (3). However, conventional surgical ligation is the ultimate request when other methods fail to achieve interruption of the shunt.

The aim of this work is to introduce and find out the applicability of trans-axillary surgical approach in closure of PDA.

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Patients and Methods

Between December 2002 and July 2004 (20 months), 15 patients underwent trans-axillary surgical ligation of PDA in Al-Azhar University hospital Cairo, Egypt. There were 4 males and 11 females. Their age ranged from 25 days to 90 months and body weight ranged from 3.7 to 23 Kg (average 10.13 Kg). Two had undergone urgent and 13 elective operations. The studied patients had pre and post-operative clinical assessment, routine laboratory investigations, CXR, ECG and echocardiography.

Operative technique: The child is positioned dead lateral on the right side with the arm fully abducted and raised up. The forearm is flexed 90 degrees forward at the elbow and supported to be kept in the same position through the procedure. The incision extends between the anterior and the posterior axillary folds. The incision is 4 centimetres down the skin of the apex of the axilla and over the upper border of the 4th rib. The incision cuts down to the axillary fascia, reaching to the fleshy fibres of the upper digits of the serratus anterior muscle. At this stage it is quite easy to identify the 3rd and 4th ribs. The pleura is entered through the upper border of the fourth rib (third inter costal space). It is important to disconnect the patient from the ventilator during entering the pleura, to avoid injury of the lung.

Once the pleura is entered, assessment of the anatomy is mandatory followed by identifying the duct, which is lying between the aortic arch, descending aorta laterally and the pulmonary artery tree medially. The parietal pleura is opened and the duct dissected from the connective tissue around it. It is our policy to use double ligatures for closure of the PDA. After ligation the pleura is closed with interrupted sutures with good haemostasis. Usually closure is done in layers with chest drain for 12 hours. All efforts are done to re-inflate the lung before closure. At the end of the procedures the child is transferred to the intensive care as a routine pathway for all children.

The follow up was achieved 10 days post-operatively, then every 3 months subsequently.

Results

There was one premature patient who required mechanical ventilation since birth and 14 full term patients. Four patients were suffering from right ventricular (RV) failure (27%), 7 from failure to thrive (47%) and 11 from recurrent chest infection (73%). Ten patients (75%) had been on anti-failure measures before surgery, consisted of Digitalis (Lanoxine), diuretics and angiotensin converting enzyme inhibitor (capotine). Ten patients had classic PDA murmur (33.3%). Plain chest X ray showed cardiomegaly with RV enlargement of all studied patients. ECG showed also sinus tachycardia in 11 patients (73%). Echocardiography showed concordant situs solitus with isolated PDA lesion (table 1).

PDA	NO. Patients	%
Size 5-7 mm	6	40%
Size 8-12 mm	9	60%
Length 5-10 mm	4	27%
Length 11-15 mm	11	73%
Gradient 30-40 mm Hg	8	53%
Gradient 45-55 mm Hg	7	47%
LV function > 50%	10	67%
LV function <50%	5	33%

Table 1: Echocardiographic finding.

The main indication of surgery was right ventricular failure in 4 patients (27%), 2 of them (13.5%) required mechanical ventilation hours after birth, 5 patients with failure to thrive (33%) and 6 patients (40%) with recurrent chest infection (table 2).

Indication	Patient No.	%
RV failure	4	27%
Failure to thrive	5	33%
Recurrent chest infection	6	40 %

Table 2: Main indications of surgical ligation of PDA.

The time lapsed in surgery from skin incision to skin closure ranged from 25 to 40 minutes, average 33.47 minutes. There was no intra-operative mortality or bleeding. However, one patient (6.6%) had injury to the thoracic duct intra-operatively. Thirteen patients were extubated on the operating table (87%) and 2 patients (13%) required mechanical ventilation for 26 & 36 hours. The last patient who developed chylothorax. He was managed conservatively by intravenous fluid and diet free from long chain fatty acids. The under water seal drainage tube was removed in range of 12 to 24 hours (average 14.6 hours) except in the patient who developed chylothorax was removed after 8 days. The total blood loss through the under water seal container was ranged from 20 to 50 mils in average of 30 mils. There was no early wound infection, dehiscence or

This study reported no early or late mortality. As well did not report any case of lung collapse that presents a critical problem post-operatively in children. No early wound infection or mechanical dehiscence. In closure of the wound we use interrupted absorbable sutures, one stitch to approximate the ribs and three to approximate the digits of the serratus anterior muscle.

The range of stay in the paediatric intensive care was from 12 to 48 hours in average of 23 hours. The range of stay in the hospital from date of surgery to discharge was from 3 to 12 days in average of 5.3 days. This result was reasonable to the other reports taking in consideration the differences in number, age, body weight and the medical circumstances of each reported group.

The common complications of wound in children who had their operation performed with standard approach were unsightly scar and keliod in our experience. Over 20 months of follow up, there was no re-addmition to the hospital, wound infection, mechanical dehiscence or unsightly scar of the studied patients. It would be reported that even if there is any wound problem, the upper arm would hide it and this is one of the advantages of this approach. We would see the happiness of the patients' family post-operatively coming from this point and unless some person can mention the story about the operation no one's would know about it.

Conclusion

Trans-axillary approach for closure of patent ductus arteriosus is an alternative incision to the conventional methods, more cosmetic, not muscle cutting and easy approach particularly in infancy.

Difficulties with this work: Small number of the studied patients due to infrequent referred cases of isolated PDA from the Cardiologist to the Surgeon.

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