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**PDA Ligation in Adults – A 2-years Experience in Tikur Anbassa Hospital, Addis Ababa University College of Health Sciences, School of Medicine**

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**Background:** *Persistent Ductus Arteriosus (PDA) is commonly diagnosed & treated in infancy. It is unusual to see patients with PDA in adults in developed countries.*

**Methods:** *Retrospective analysis of charts of adult patients who were operated & PDA ligation done in Tikur Anbassa specialized hospital starting from September 1, 2009 to August 31, 2011 was made.*

**Results:** *Out of thirty one patients operated in two years time, twenty six(84%) charts could be retrieved. Nineteen pts(73 %) were female & Seven pts(27 %) were male. The commonest age group was 16-20(46%). The commonest presenting symptom was exertional dyspnea(61%), three pts(12%) were asymptomatic. Twelve pts(46%) were on medical treatment preoperatively. Fifty four percent of pts had PDA size 5-8mm. One patient died during reoperation .*

**Conclusion:** *In developed countries , PDA is exclusively managed at infancy but in developing countries like ours, PDA may present in adults with symptoms and if there is no evidence of significant pulmonary hypertension ,PDA ligation is safe and effective.*

**Key words:** Ductus, arteriosus, patent

**DOI:** <http://dx.doi.org/10.4314/ecaajs.v21i3.4>

**Introduction**

Patent ductus arteriosus (PDA) is a vascular structure that connects the proximal descending aorta to the roof of the main pulmonary artery near the origin of the left branch pulmonary artery. This essential fetal structure normally closes spontaneously after birth. After the first few weeks of life, ductal patency is abnormal. The physiological impact and clinical significance of the PDA depend largely on its size and the underlying cardiovascular status of the patient<sup>1</sup>. The PDA may be "silent"(not evident clinically but diagnosed incidentally by echocardiography done for a different reason) , small, moderate, or large<sup>2</sup>. PDA accounts for approximately 10% of all congenital heart diseases , with an incidence of at least 2-4 per 1000 term births. The female to male ratio is 2:1 in most reports<sup>3,4</sup>. The factors responsible for persistent patency of the ductus arteriosus beyond the first 24 to 48 hours of neonatal life are not completely understood. Prematurity clearly increases the incidence of PDA , and this is due to physiological factors related to prematurity rather than inherent abnormality of the ductus<sup>5</sup>. In term infants, cases most often appear to occur sporadically, but there is increasing evidence that genetic factors play a role in many patients with ductus .In a family having one sibling with a PDA, there is a 3% chance of PDA in a subsequent offspring(6). In addition, other factors such as prenatal infection appear to play a role in some cases<sup>7</sup>.

Closure of the large, hemodynamically significant PDA is established as the standard of care, and can be performed safely and effectively using either surgical or transcatheter methods<sup>8,9</sup>. In asymptomatic patients with significant left to right shunting that results in left heart enlargement , closure is indicated to minimize the risk of complications in the future. The appropriate management of the very small, hemodynamically insignificant PDA is less clear<sup>10,11</sup>. Routine closure of such defects has been advocated to eliminate or reduce the risk of infective endocarditis. Because closure methods are effective and safe & are associated with minimal morbidity, a strategy advocating routine closure of any PDA in children & young adults appears most reasonable. Surgical ligation or division of the PDA remains the treatment of choice for the rare very large PDA. Rarely a large window-type PDA may have insufficient length to permit ligation and the appropriate surgical procedure is patch closure on cardiopulmonary bypass<sup>12,13</sup>.

Complete closure rates of surgical ligation range from 94% to 100%, with 0% to 2% mortality. Important complications include bleeding, pneumothorax, infection, and rarely ligation of the left pulmonary artery or

Aorta. Surgical morbidity, cost and hospital length of stay have been decreased with use of transaxillary muscle-sparing thoracotomy & by the technique of video-assisted thoracoscopic ligation of PDA<sup>14, 15</sup>.

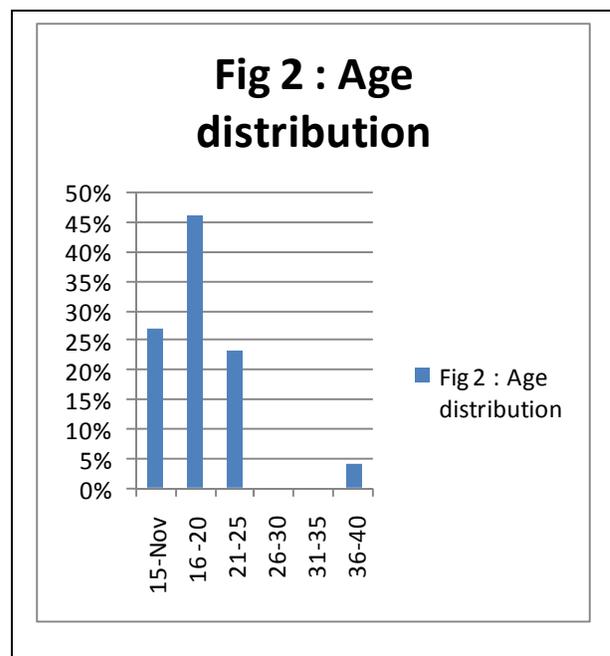
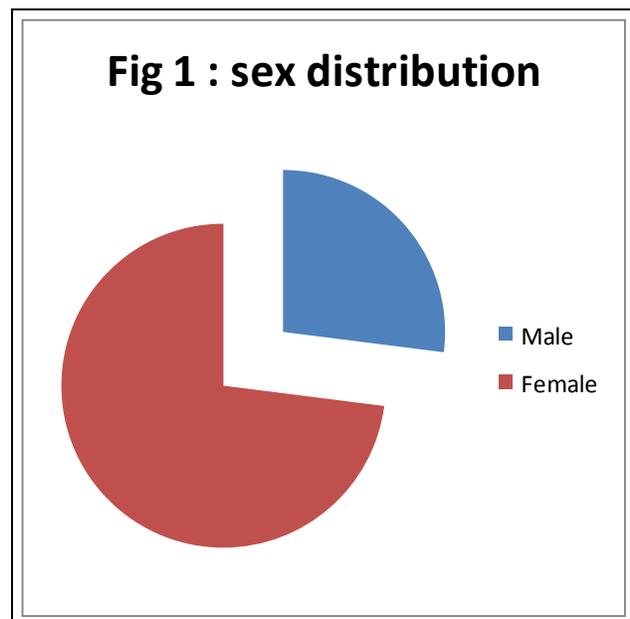
### Patients and Methods

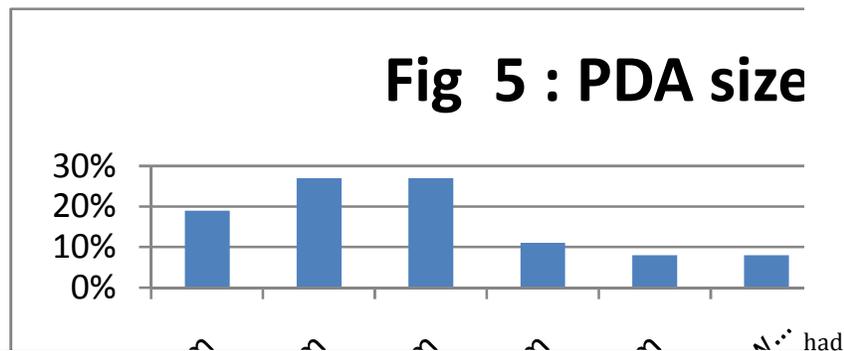
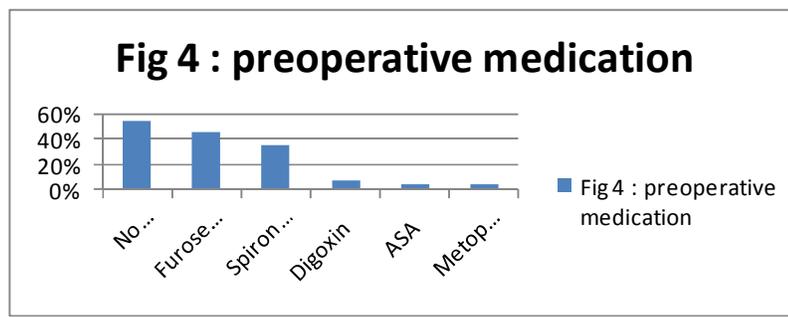
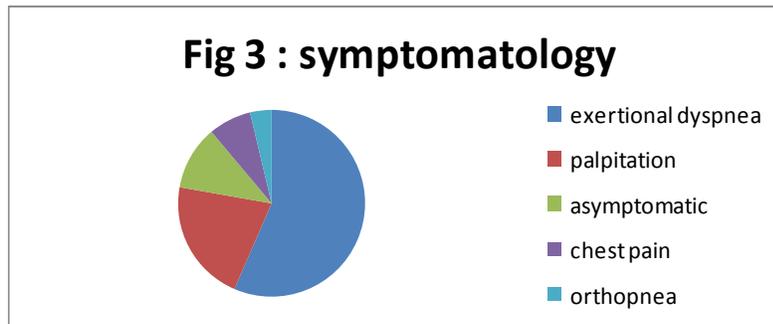
Retrospective analysis of collected charts of adult patients operated for PDA in Tikur - Anbassa Hospital starting from September 1, 2009 up to August 31, 2011 done. Out of the 31 patients operated in the specified time period, 26 of the charts were available in the record office while 5 of the charts were missing & are not included in the study. All 26 patients had echocardiography as the main diagnostic tool. All had left to right shunt & had no significant pulmonary hypertension. All of them had the operation done under general anesthesia with single lumen endotracheal intubation & intra operative transesophageal stethoscope monitoring of the murmur. All of them had double ligation of the PDA by silk ties. Routine chest wall closure over a chest tube left for 48 hours used.

### Results

Nineteen of the 26 patients (73%) were females & 7 (27%) were male patients. Ages ranged from 14 to 40 but the commonest age group was 16 - 20 (46%) (Figure 2). Exertional dyspnea was the commonest presenting symptom occurring in 16 (61%) of patients. Palpitation (23%), chest pain (8%), and orthopnea (4%) were the rest of the symptoms. 3 patients (12%) were asymptomatic and therefore "silent" PDA (Fig. 3).

Fourteen (54%) of the patients were not taking any medication while the rest 12 (46%) were taking medications preoperatively. Postoperatively none needed medications. All 12 patients took oral furosemide and 9 of them additionally took spironolactone. Two patients took digoxin, one patient ASA & one patient was on metoprolol (Figure 4). One patient (4%) had infective endarteritis before surgery & operated after the endarteritis is treated successfully medically. PDA sizes as measured by echocardiography ranged from 3mm to 11 mm (Fig 5). On postoperative echocardiography one patient (4%) was reported to have residual PDA but is asymptomatic & is still on the same condition on follow up.





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There was one death(4%) related to PDA surgery. This 15 years old girl was found to have left pulmonary artery ligated in place of the PDA on postoperative echocardiography & patient was reoperated. On reoperation the arterial side of the PDA was found aneurysmal & tore on dissection & patient bled to death on the table.

## Discussion

The F: M sex ratio was 3 : 1 as compared with the global F: M ratio of 2:1<sup>1</sup>. Population studies are needed to confirm this difference. The success rate in our PDA ligation was 92% which was comparable with the global figures of 94-100%. We had one death (4% mortality rate). Because of the small size of the study (only 26 cases) it is difficult to compare the mortality of global figures which is 0-2%. From this small study surgical ligation of PDA in adults seems a safe & effective surgery & it is to be encouraged<sup>14,15</sup>. Our patient who died probably would have been saved if the reoperation was done with cardiopulmonary bypass<sup>12, 13</sup>. So we suggest difficult cases like reoperations and huge and short PDA cases be operated with cardiopulmonary bypass. The fact that only 12% of our patients had "silent" PDA shows that PDA needs closure even if patients are adults as it causes symptoms in addition to the possible complications like endarteritis and others<sup>2</sup>. The fact that 46% of patients were taking medications implies that PDA is an important cause of symptoms in adults although this is a hospital based study & therefore could suffer selection bias. Clearly a population based study is needed to confirm the degree of symptoms PDA causes.

The age distribution (Figure 2) shows a gap between 25 and 36. But it is only one case at 36 – 40 years so it appears that the commonest age of PDA in adults to be 25 – 35 years. This also needs a population based study to confirm these results.

The size of PDA is 5 – 8 mm in more than half of the cases (Figure 5). We also had huge PDA sizes (> 11 mm) in 8% of cases. There could be selection bias in the size of PDA again either because symptomatic cases presenting to the hospital could be bigger sizes and small size PDA being handled by catheter methods<sup>2</sup>.

## Conclusion

Overall from this small scale hospital based retrospective study, it can be concluded that PDA is still a health problem in this country & can be handled by surgical ligation safely in most of the cases even if open heart surgery facilities are not available. But a population based large scale study is needed to confirm the incidence, percentage of symptomatic cases and correlation between size of PDA and seriousness of the symptoms. A comparative study comparing transcatheter device closure with surgical ligation is also necessary as few patients are being managed by transcatheter means in this country<sup>8,9</sup>.

## Acknowledgement

Tikur Anbassa hospital record office provided the patients documents without which it would have been impossible to do this job. Cardiothoracic unit in surgery department of medical faculty, Addis Ababa university and staff are involved both in the surgery of patients and follow up, & also on reviewing the paper with special guidance and tutoring by Prof Adem Ali, head department of surgery, Addis Ababa university medical faculty.

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