

Results of patients with PDA receiving surgical ligation— Cases analyzed in different years and various kinds of hospital from the database of National Health Insurance

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Abstract

The purpose of this report is to compare the results of surgical ligation of patent ductus arteriosus (PDA) in different years and various kinds of hospital.

The sources of data which are discussed and analyzed about surgical ligation of PDA are most from one or some medical centers up to now; however, these data cannot present the true event of a country. No any study about this issue, which source of data is from the database of National Health Insurance, which is a full data of medical record in a country or region and obtained via application for research, has been discussed and analyzed.

During a four-year period (1996~1999), 1708 patients receive surgical ligation of PDA from the database of National Health Insurance in Taiwan, 52 patients receive more than once of PDA ligation.

In this study, mean failure rate is 3.04%; the results also reveal that the annual failure rate and case numbers are declined year by year. It represents that our cardiovascular operative ability and neonatal intensive care level are advance gradually day by day.

Key words: surgical ligation, patent ductus arteriosus (PDA), failure rate, database of National Health Insurance

Introduction

Patent ductus arteriosus (PDA) is a heart defect that occurs when the ductus arteriosus does not close at birth.

The ductus arteriosus is a temporary fetal blood vessel

that connects the aorta and the pulmonary artery before birth. It should be present and open before birth when the fetus is developing in the uterus.

Since oxygen and nutrients are received from the placenta and the umbilical cord instead of the lungs, the ductus arteriosus allows blood to bypass the deflated lungs and go straight out to the body.

After birth, when the lungs need to add oxygen to the blood, the ductus arteriosus normally closes. The closure of the ductus arteriosus ensures that blood goes to the lungs to pick up oxygen before going out to the body.

Closure of the ductus arteriosus usually occurs at birth as levels of certain chemicals, called “prostaglandins”, change and the lungs fill with air. If the ductus arteriosus closes correctly, the blood pumped from the heart goes to the lungs, back into the heart, and then out to the body through the aorta. The blood returning from the lungs and moving out of the aorta carries oxygen to the cells of the body.

In some infants, the ductus arteriosus remains open and results in heart defect is known as PDA. In majority patients, a small PDA does not result in physical symptoms; however, if the PDA is huge, health complication problems may occur.

The patients with PDA present difficulty problems in management especially combined with premature infants, whether the treatment is medical or surgical.

The treatment and management of PDA depends on the size and symptoms being experienced by the affected

individual. In some patients, a PDA can be corrected itself in the first months of life. In the majority of premature infants experiencing symptoms, the first step in correcting a PDA is prescribed prostaglandin inhibitor, such as indomethacin. In premature infants whose PDA is unable to be close by medical management; however, for full term infants and adults, surgical ligation is an option for closing the ductus arteriosus. Recently, medicine has developed and reviewed alternatives to surgical closure such as interventional cardiac catheterization [7-8, 11, 16, 20-21]. A cardiologist can help individuals determine the best method for treatment based on their physical symptoms and medical history.

The sources of data which are discussed and analyzed about surgical ligation of PDA are most from one or some medical centers up to now; however, these data cannot present the true event of a country. No any study about this issue, whose source of data is from the database of National Health Insurance, which is a full data of medical record in a country or region and obtained via application for research, has been discussed and analyzed.

Literature Reviews

Although methods for treatment of PDA are various; medical procedures, such as drugs administration [2, 5, 9-10, 13, 19] or catheter embolization [11, 16, 20] are generally precedent. However, surgical intervention for PDA closure is still envisaged while medical procedures are failed or contraindicated.

Many reports [2, 9, 13, 19] suggest that medical closure of PDA is not always successful, including reopening the PDA after drugs administration [12, 23], hemolysis happening or occlusion devices dropping in pulmonary artery after catheter embolization [3, 22]. On the other hand, many newer and safer surgical procedures are present, such as video-assisted thoracotomy (VAT) [15, 18], minimally invasive surgery [14], surgery in NICU [4, 6], and so on. Nonetheless, failure of surgical ligation for PDA still occurs due to various reasons, such as insufficient facility of some hospitals, inexperienced ability of

neonatal care and cardiovascular surgery, etc.

Unfortunately, failure of surgical ligation of PDA also occurs in Taiwan, even the majority of these operations are performed in equal level of medical center and we have sufficient ability of neonatal care and cardiovascular surgery. We use the database of National Health Insurance to search and discuss the results about failure rate of surgical ligation for PDA.

Materials and Methods

In Taiwan, National Health Insurance is compulsive and general; most of the database of National Health Insurance is partial and selected, which cannot be used to compare each other. By exception, the medical records of major diseases are complete. Because all patients with PDA belong to one of major diseases, and the database of major diseases is full without any selection, we can use this database to analyze the results of surgical ligation of PDA in Taiwan.

In this study, failure for surgical ligation of PDA is defined that enrolled patients who receives more than once surgical ligation in this four-year period; under this condition, the failure rate will be countered to the first year and the first hospital.

In addition, patients who receive surgical ligation of PDA and stay at hospital more than one month due to major disease belongs to continuous admission, which may present more than once at the database of National Health Insurance; in this situation, surgery is successful. Therefore, we collected and analyzed the data of surgical ligation of PDA from the database of National Health Insurance in different years and various kinds of hospital.

Results

During a four-year period (1996-1999), 1708 patients receive surgical ligation of PDA from the database of National Health insurance in Taiwan. 52 patients who receive more than once of PDA ligation are compatible with the definition of failed PDA surgery in this period; the mean failure rate is 3.04%.

The failure rate of different years and various kinds of

hospital in this four-year period are also presented at table 1 and table 2, respectively. At table 2, no failure case of surgical ligation is noted in some kinds of hospital.

Table 1: The annual failure rate

[#]Denominator: All sample number - repeat sample number + actual failure case number

1996	20/378 [#] (403-55+30)=5.29%
1997	13/416 [#] (441-47+22)=3.12%
1998	10/406 [#] (442-62+26)=2.46%
1999	9/508 [#] (556-86+38)=1.77%

Table 2: The failure rate of various kinds of hospital

Hospitals Subordinate to DOH and Municipal Hospitals	2/15=13.3%
Hospitals Affiliated with Public Medical Schools	8/341=2.35%
Veterans (General) Hospital	14/404=3.47%
Non-Profit Proprietary Hospitals	20/769=2.60%
Hospitals Affiliated with Medical School.	8/121=6.61%
Civilian Clinics of Military Hospitals	0/6
Hospitals Affiliated with Non-Profit Proprietary Religious Organizations	0/38
Hospitals Affiliated with Other Non-Profit Proprietary Organizations	0/2
Private Hospitals	0/12

Discussion

The mean failure rate of PDA ligation during this four-year period from the database of National Health Insurance is 3.05%, which is accordant to world-class level (4%~26%) [17, 20].

The case numbers of failed PDA ligation in this four-year period are decreased year by year (from 20 to 9); furthermore, the failure rate of PDA ligation is also declined (from 5.29% to 1.77%). So, we think that the ability of cardiovascular surgery is more advance in Taiwan day by day.

On the other hand, most patients of receiving PDA ligation are premature infants, who are necessary to be cared by experienced neonatologist and intensive neonatal nursing care. The case numbers of receiving PDA ligation are gradually increasing during this four-year period (from 378 to 508), it also represents that our ability of neonatal intensive care is more advance than we were.

The failure rate of PDA ligation in municipal hospital is much higher than other kinds of hospital (13.3% vs. 2.35%~6.61%). We think that patients receiving PDA ligation in municipal hospital are much few than others (15 vs. 121~769), it might be due to insufficient facility or inexperienced ability of cardiovascular surgery and intensive neonatal care. The much few patients receiving PDA ligation might be the reason mentioned above, which might result in distorting failure rate.

We also find out that almost half (769/1708=45%) of the patients received PDA ligation in non-profit proprietary hospitals. This ratio is compatible with the distribution of using the majority resource of health insurance ligation in non-profit proprietary hospitals [1].

Future Foresight

Since the reasons of failed surgery for PDA ligation are various, including insufficient facility of hospital, inexperienced ability of cardiovascular surgery and neonatal intensive care, severity of disease itself, general condition of affected patients, and so on. Most of these reasons are not presented in the database of National Health Insurance in Taiwan due to confidentiality or technical problems. We cannot figure out the details of these reasons from the database of National Health Insurance in order to analyze and discuss the influence of these reasons.

In addition, current coding information about hospitals from the database of National Health Insurance has been modified, and it cannot present the result of single hospital. If the sufficient information of each hospital is able to be obtained from the database, we can further analyze the failure rate of each hospital and compare the

results of surgery in hospital itself with others.

For most patients who receive surgical ligation of PDA do not response to medical procedures, including catheter embolization, drugs administration (oral or intravenous), or contraindicated; in the future, we can also analyze and discuss the results of difference in medical procedures to surgical methods from the database of National Health Insurance.

Fortunately, the stage 2 and 3 of IC card for National Health Insurance which enrolls most private information, such as personal basic data and medical record, will be achieved in the near future. More and more useful information will be obtained and can be discussed and analyzed to conclude more useful results for medical institution and the publics in Taiwan.

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