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REVIEW ARTICLE

THE INVENTION OF PEDIATRIC AND CONGENITAL HEART SURGERY

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Abstract

The history of pediatric and congenital heart surgery is presented with all the most relevant “inventions”, from the first successful closure of patent ductus arteriosus on 1938. The “inventions” have been divided in two groups: A) closed heart operations, without extracorporeal circulation; and B) open heart operations, with the use of extracorporeal circulation. The technical aspects have been presented, as well as the difficulties due to the limited knowledge, reduced availability of technology, and obstructing environment. The history of the progress made possible by the pioneers is useful to understand what is behind the outcomes obtained in the current period.

Keywords: Cardiopulmonary Bypass, Congenital Heart Defects, Palliation, Pediatric Cardiac Surgery, Repair

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Introduction

The history of the surgical treatment of the congenital heart defects started despite and against the condemnation given by one of the pioneers of surgery, Theodore Billroth, who on 1910 wrote: “Any surgeon who wishes to preserve the respect of his colleagues would never attempt to operate on the heart” [1]. Interestingly enough, Billroth was more concerned for the respect of his colleagues than for the health of the patients, and unfortunately this problem is still present in the medical community after one century.

For the sake of simplicity, the history of the inventions allowing the dream of pediatric and congenital heart surgery becoming the current reality is divided in closed and open heart operations, referring respectively to surgical procedures performed without and with the heart-lung machine.

A) Closed Heart Operations

The first reported closed heart operation was the closure of a patent ductus arteriosus (PDA), performed by John W. Strider in Boston on 6th March 1937 [2]. There was a patient 22 year-old with clinical diagnosis of sub-acute endocarditis on a PDA. The
surgeon decided to try to close the PDA, and in fact after closing the PDA he noted that the “palpable thrill disappeared”. Because the operation was done in the era before the availability of antibiotics, the patient despite adequate closure of the PDA died because of sepsis on the 4th post-operative day. Autopsy revealed a large endocarditis vegetation from the ductus arteriosus reaching the pulmonary valve. Despite the hospital mortality, the first closed heart operation demonstrated that the surgical closure of a PDA was technically feasible. And after since, the risk of post-operative sepsis remained a constant nightmare for all cardiac surgeons.

Robert E. Gross performed the successful first PDA closure at Children Hospital in Boston on 26th August 1938. The patient was a very sick 7 year-old boy, who underwent surgical closure of the PDA, was discharged home on the 10th post-operative day and became a long-term survivor. Dr. Robert E. Gross performed the operation against the advice of his Chairman, Prof. William Ladd, while he was travelling in Europe. When his Chairman returned to Boston, he immediately fired Dr. Robert E. Gross. After almost a century, the problem of jealousy among colleagues has not been yet abolished, at least in the surgical departments.

On 1944 at John Hopkins Hospital in Baltimore Dr. Alfred Blalock and his colleague EA Park in the experimental animal laboratory were studying on a canine model a surgical procedure to treat the aortic coarctation (AoCo): the anastomosis of the distally transected left subclavian artery to the descending thoracic aorta. The Blalock-Park shunt was complicated by elevated incidence of paraplegia in their experimental series in animals because of the long duration of the aortic cross clamping in the absence of adequate collateral circulation.

On the same year 1944 Clarence Crafoord at Karolinska Institute in Stockholm successfully operated the first 2 patients with AoCo with his technique of resection and end-to-end anastomosis. The success of this procedure was attributed to the fact that he was routinely using aortic cross-clamping during closure of PDA.

In the same year 1944, few months later, Dr. Robert E. Gross, who moved to another hospital in Boston, performed a successful operation for AoCo with the same technique of resection and end-to-end anastomosis. Again Robert E. Gross was the first to perform in Boston on 1948 the successful surgical treatment of a long-segment AoCo with resection and interposition of an aortic homograft.

A couple of decades later John A. Walldhausen introduced for the surgical treatment of AoCo the technique of subclavian flap: enlargement of the aortic isthmus by the distally transected subclavian artery opened longitudinally and used as a flap.

After other two decades Martin J. Elliott popularized the technique of resection and end-to-end anastomosis enlarged to the aortic arch for AoCo with associated hypoplasia of the aortic arch. These last two surgical techniques are still the most utilized nowadays for the treatment of the AoCo in neonates. Interposition of a prosthetic conduit between the ascending and descending thoracic aorta was introduced to treat complex aortic coarctation.

In the same period of the first successful operations for PDA and AoCo, the cyanotic congenital heart defects attracted the
attention of the pioneers of cardiac surgery. Dr. Alfred Blalock in Nashville with his laboratory technician Vivien Thomas wanted to create an experimental model of pulmonary hypertension by anastomosing the left subclavian artery to the left pulmonary artery after ligation of the pulmonary artery. Their model failed to create pulmonary hypertension, since in the presence of low pulmonary vascular resistance they obtained only an increased pulmonary blood flow.\textsuperscript{14} When Alfred Blalock was appointed at the John Hopkins Hospital in Baltimore, Dr. Helen Taussig, pediatric cardiologist, persuaded him to apply his experimental technique to the cyanotic children, and on 29\textsuperscript{th} November 1944 the first systemic-to-pulmonary shunt was performed in a girl 16 month old, 4 kg, with tetralogy of Fallot, with the diagnosis based on clinical signs, electrocardiogram and X-ray.\textsuperscript{14} Even if the first right Blalock-Taussig shunt closed after 2 weeks, another shunt was done on the left side, and the patient died 4 days after the 2\textsuperscript{nd} procedure, the operation opened the doors to the long-term palliation of cyanotic congenital heart defects.\textsuperscript{16}

Within the following years the principle of a systemic-to-pulmonary shunt to increase the pulmonary blood flow and improve the oxygenation in cyanotic children was followed with technical modifications, such as the side-to-side anastomosis of the descending thoracic aorta to the left pulmonary artery (Potts shunt) introduced by Dr. Potts on 1946 and the side-to-side anastomosis of the ascending thoracic aorta to the right pulmonary artery (Waterston shunt) reported by Dr. Waterston on 1962.\textsuperscript{17,18} The last two types of systemic-to-pulmonary shunt were abandoned because of their technical difficulties as well as the complications induced on the pulmonary circulation, and the classic Blalock-Taussig shunt was made obsolete by the introduction of the anastomosis of a PTFE tubular prosthesis between the right or left subclavian artery to the omolateral pulmonary artery (modified Blalock-Taussig shunt) by Drs. Redo and Ecker on 1963.\textsuperscript{19}

In the same period two alternative surgical approaches were utilized to increase the pulmonary blood flow: the trans-ventricular pulmonary valvotomy, performed the first time on December 1946 by Dr. Thomas Holmes Sellors at Guy’s Hospital in London and the end-to-side anastomosis of the transected right pulmonary artery to the distally ligated superior vena cava, introduced by Dr. W.W.L. Glenn on 1957.\textsuperscript{20,21} Both the closed pulmonary valvotomy and the Glenn anastomosis remained for decades in the armamentarium of pediatric cardiac surgeons, and with technical modifications they are still used in the current era.\textsuperscript{22}

On 1951 W.H. Muller and J.F. Damman performed the first Pulmonary Artery Banding (PAB) as palliative treatment for patients with intra-cardiac left-to-right shunt and pulmonary hypertension.\textsuperscript{23} Twenty years later Trusler and Mustard introduced a formula to estimate the length of the band, with the circumference of the band in millimeters equal to the body weight of the patient in kilograms plus 20.\textsuperscript{24} Despite the application of the Trusler formula, the main problem of PAB remained the inadequate band sizing, with pulmonary over- or under-circulation, and the subsequent heart failure or cyanosis. This problem was solved by the research and development, conducted by the Author of this article, of an implantable telemetrically adjustable PAB device (FloWatch-PAB\textsuperscript{®}) first tested with long-term experimental studies on animals, followed by the successful extensive clinical
applications for different types of congenital heart defects. 25,26-31

Before the advent of the era of open heart surgery, two techniques addressed the inter-atrial septum: the first to create and the second to close an atrial septal defect (ASD).

Again at John Hopkins hospital in Baltimore, C.R. Hanlon performed on dogs in the experimental research laboratory an atrio-septectomy to create an ASD, by surgically removing the side portion of the inter-atrial septum with temporary occlusion of the right pulmonary artery and veins. Following these experimental study, Alfred Blalock on 1948 introduced the atrio-septectomy, after since called Blalock-Hanlon procedure, to reduce cyanosis in congenital heart defects characterized by poor mixing. 32

Gordon Murray reported on August 1948 the first partially successful attempts at closing ASDs using of the right atrial wall with a suture technique without direct visualization. 33

Robert E. Gross in Boston once again made a major contribution to the inventions in cardiac surgery for congenital heart defects reporting on May 1952 a very ingenious technique: the atrial “well”. 34 The right atrial well was constructed by suturing a rubber funnel to the right atrial wall to prevent exsanguination and air embolism; through the well, and under a contained and stable column of blood, the ASD was identified through direct palpation and closed with a suture technique without direct visualization. 34 Despite the technique was quite rudimentary, after few years John W. Kirklin reported a series of 29 patients successfully treated with the atrial “well” technique without mortality, remarkable result for that period. 35

B) Open Heart Operations

While the inventions of the pioneers have initiated the history of pediatric cardiac surgery with the closed heart procedures, almost simultaneously at the beginning of the fifties the major progress in the surgical treatment of congenital heart defects has been made possible by the introduction of the different open heart surgical techniques. Wilfred G. Bigelow presented remarkable results with experimental studies on dogs investigating the possibility of maintain the animals alive thanks to hypothermia, and he speculated that his hypothermic technique could have a role in cardiac surgery. 36 Floyd John Lewis at the University of Minnesota applied the hypothermic technique for the first time in a patient on 2nd September 1952: a 5-year old child underwent successful closure of an ASD under direct vision. 37 After a period of 130 minutes of systemic surface cooling, at core temperature of 28°C a right thoracotomy was performed and with 5 minutes of inflow occlusion the ASD was closed. 36 This technique allowed a mortality reduction from the 30.2% observed with the original atrial “well” technique to 12.1% obtained with the hypothermic inflow occlusion. 38 Floyd John Lewis succeeded also in the first repair of total anomalous pulmonary venous connection with his technique of systemic surface cooling and inflow caval occlusion. 39

But the major impact for the intra-cardiac repair of congenital heart defects was due to the introduction of the extracorporeal circulation by John H. Gibbon. After years of studies to develop the first heart-lung machine, he reported the first successful closure of an ASD in a patient 18-year old at
the University of Pennsylvania on 1953 using extracorporeal circulation with an artificial oxygenator.\textsuperscript{40}

In the same period the two major contributions to the diffusion of open heart surgery for congenital heart defects were both provided in the state of Minnesota, respectively at University of Minnesota and at the Mayo Clinic, in Rochester.

After extensive experimental research on dogs conducted by Clarence Walton Lillehei, Morley Cohen, Herbert Edgar Varden, and Richard L. Varco, Clarence Walton Lillehei managed to perform at the University of Minnesota the first clinical application of the controlled cross-circulation on 26\textsuperscript{th} March 1954.\textsuperscript{41,42} The patient as an 1-year old boy with a body weight of 6.9 kg; his circulation was supported by the father through femoral artery and vein cannulation for a period of 19 minutes, allowing closure of a ventricular septal defect (VSD) under direct vision.\textsuperscript{42} The patient died after 11 days because of pneumonia, but this doesn’t stopped Lillehei from continuing the program. After 2 weeks, against institutional bias but with the full support of his chairman, Owen Wagensteen, Lillehei operated on the second patient with the technique of controlled cross-circulation; a 4-year old girl successfully underwent direct closure of VSD and became a long-term survivor.\textsuperscript{43} When Lillehei presented the technique of controlled cross-circulation with the first series of positive results to the American Association of Surgery, he was accused of having invented an operation with potentially 200\% mortality. Despite the criticism received from the medical community, Lillehei used the controlled cross-circulation to perform a total of 45 operations for congenital heart defects, including the first repair of VSD but also of atrio-ventricular septal defect (AVSD) and tetralogy of Fallot.\textsuperscript{44,45} In this exceptional series of cases the hospital mortality was 38\%, but 79\% of the hospital survivors were still alive after 30 years of follow-up.\textsuperscript{46} The relatively elevated hospital mortality was not correlated to the technique of controlled cross-circulation, but most of the deaths were due to heart failure due to surgically induced complete atrio-ventricular block. In that period the anatomy of the conduction tissue was still unknown, and pace-makers didn’t exist. Because of this reason Lillehei and Gott worked also to develop and introduce the first temporary and then permanent implantable pace-maker and myocardial electrode.\textsuperscript{47,48}

Simultaneously to the clinical use of the controlled cross-circulation, Lillehei was also conducting experimental research with the Belgian Richard A. DeWall to develop an oxygenator for extracorporeal circulation; with the clinical introduction of the DeWall-Lillehei pump with helical reservoir bubble oxygenator, the controlled cross-circulation was abandoned at the University of Minnesota.\textsuperscript{49}

In exactly the same period and in the same state of Minnesota, John W. Kirklin, at that time working at the Mayo Clinic, was working on the extracorporeal circulation developed by Gibbon.\textsuperscript{40} Thanks to all his efforts, Kirklin accomplished the production of the Mayo-Gibbon system for cardiopulmonary bypass.\textsuperscript{50} The clinical introduction of the cardiopulmonary bypass system allowed the surgical repair of various congenital heart defects, reported by John W. Kirklin with an outstanding series of first repairs with extracorporeal circulation: tetralogy of Fallot, VSD and total anomalous pulmonary venous connection.\textsuperscript{50,51,52}
The developments occurring in the 50s in Minnesota, with the achievement of the clinical availability of the heart-lung machine to perform intra-cardiac repair of various congenital heart defects, attracted the interest of the medical community, and the Mayo Clinic in Rochester was in that period the preferred destination for many surgeons keen to learn the developing techniques. One of these was GianCarlo Rastelli, who after being refused an assistant position in his home place at University of Parma, Italy, was accepted for the surgical training at Mayo Clinic by Dwight C. McGoon at the beginning of the 60s. Shortly after beginning his training in cardiac surgery, GianCarlo Rastelli diagnosed himself a Hodgkin disease, and realized that the short life expectancy accompanying the disease was precluding the possibility of a clinical career. At that point, very bravely, he decided to dedicate all the remaining time of his life to study the congenital heart defects, in particular the morphology and pathophysiology, and possibly new surgical procedures for repair. In few years, with the total support of Dwight C. McGoon and the Mayo Clinic, GianCarlo Rastelli made important contributions to the surgical treatment of congenital heart defects, starting with the discovery of the different types of complete AVSD, classified with A, B and C, and the surgical techniques for the repair of each of them.\(^{53}\) GianCarlo Rastelli then focused his attention to the complex congenital heart defects where a biological valved conduit was required to achieve a complete separation between the systemic and pulmonary circulation with unobstructed bi-ventricular outlets. And in few years GianCarlo Rastelli came out with his revolutionary techniques, all based on the implantation of a homograft between the right ventricle and the pulmonary artery, allowing for the first time the surgical repair of patients with pulmonary atresia with VSD, truncus arteriosus, and transposition with VSD and pulmonary stenosis.\(^{54,55,56}\) All these operations were successfully performed for the first time in the 60s at Mayo Clinic, following the indications received by the studies of GianCarlo Rastelli, and remained in the armamentarium of congenital heart surgeons until the current era. Only few details of the original techniques have been modified over the decades, particularly because of the introduction of other biological valved conduits as alternative to the homografts.\(^{57-60}\)

Another example of the contribution given by the ingenuity and creativity of unique individuals is the Damus-Kaye-Stansel procedure. At the beginning of the 70s there was no surgical option available for patients with TGA, VSD and right ventricular outflow tract obstruction. Paul S. Damus, at that time resident in general surgery, had the brilliant idea of utilizing the transacted main pulmonary artery, end to side anastomosed to the ascending aorta, to obtain unobstructed systemic perfusion. He sent a letter on 1972 to Dwight C. McGoon, who found the idea interesting. Paul S. Damus then submitted on December 1973 the manuscript “A proposed operation for transposition of the great vessels” for publication on “Annals Thoracic Surgery”. His paper was rejected because the new proposed surgical technique was considered “entirely theoretical”.\(^{61}\) The same journal “Annals Thoracic Surgery” published on 1975 an article where the same technique was utilized.\(^{62}\) The immediate “Letter to the Editor” sent by Paul S. Damus was published, giving to him the credit for the “invention of the procedure. Dwight C. McGoon, at the Mayo Clinic, Rochester, Minnesota, on 12\(^{th}\) February 1976 performed in a child 5 month old a successful operation, later named by Dwight
C. McGoon himself as Damus-Kaye-Stansel procedure, as a contribution to the young surgeon who had the original idea. The principle invented by Paul S. Damus of utilizing the transacted main pulmonary artery, end to side anastomosed to the ascending aorta, to obtain unobstructed systemic perfusion, is still used nowadays in all patients with complex intra-cardiac anatomy with obstruction to the systemic circulation.

The availability of the heart-lung machine and the increased knowledge of the morphology and pathophysiology of congenital heart defects stimulated the surgeons to approach the most complex malformations; one of these was the transposition of the great arteries (TGA). Ake Senning in the University Hospital of Zurich, Switzerland, successfully treated patients with TGA performing an atrial rerouting (or atrial switch), followed after few years by William T. Mustard who in the Children’s Hospital in Toronto, Canada introduced another technique of atrial rerouting, after 2 unsuccessful attempts at arterial switch. The two techniques of atrial rerouting (or atrial switch), Senning and Mustard procedures, have been utilized for few decades, allowing positive early and long-term results in patients with TGA, until the introduction of the arterial switch.

On 7th May 1975, in Rio de Janeiro, Brasil, Adib Domingo Jatene performed the first successful arterial switch for a patient with TGA. His original technique, requiring the implantation of a conduit between the right ventricle and the pulmonary artery, was replaced in few years by the technique invented by Yves Lecompte in Paris, France, who on 1981 reported the first successful arterial switch without the use of a conduit. The French manoeuvre, introduced by Yves Lecompte, consisting in the anterior positioning of the pulmonary artery during the arterial switch, and therefore avoiding the need of a conduit, is still the routine procedure nowadays in the arterial switch for TGA.

Only one year later Yves Lecompte introduced his new procedure for the treatment of patients with TGA, VSD and pulmonary stenosis. Following his dream to avoid the implantation of biological valved conduits in children, obliging them to a re-operation for the replacement of the conduit later in life, Yves Lecompte engineered the repair of TGA, VSD and pulmonary stenosis with the “Réparation à l’Etage Ventriculaire” (repair at ventricular level), very creative technique allowing unobstructed connection of the left ventricle to the aorta and of the right ventricle to the pulmonary artery without the use of conduit. The new technique was popularized with the acronymous of R.E.V., where the meaning of the French word rêve in English is dream. The dream of Yves Lecompte became reality, and over time the R.E.V. procedure replaced the Rastelli operation for TGA, VSD and pulmonary stenosis with better early and long-term results.

A major push to towards the early repair of congenital heart defects came from the introduction of deep hypothermia and circulatory arrest, allowing performing complex intra-cardiac repair for complex malformations in infants and even in small neonates. The technique of deep hypothermia and circulatory arrest was developed particularly by the studies of Bryan G. Barrat-Boyes, who on 1972 in Auckland, New Zealand, reported the first successful repair in a neonate with aortic arch interruption, VSD and total anomalous pulmonary venous connection.

The huge clinical experience collected by
Barrat-Boyes with deep hypothermia and circulatory arrest was followed at the Children’s Hospital in Boston, where particularly Aldo R. Castaneda obtained good results with the early repair of Tetralogy of Fallot and TGA.\textsuperscript{71-72}

The utilization of deep hypothermia and circulatory arrest proved to be complicated by early and late neurological and developmental complications, prompting to develop techniques to avoid the complete circulatory arrest, by maintaining the cerebral perfusion during the central part of the intra-cardiac repair.\textsuperscript{73,74} Nevertheless, the avoidance of deep hypothermia and circulatory arrest was considered the best approach to avoid major early and late neurological complications; extensive clinical experience with the technique of cardiopulmonary bypass, with normothermia and high flow, and without hemodilution, proved to be the most suitable option to avoid the derangements complicating the changes from the “physiological” condition of the little patients.\textsuperscript{75-77}

The arterial switch for TGA without VSD was impossible because of the inadequacy of the left ventricle to support the systemic circulation after the first few weeks of life. This problem was solved with the experience collected by Magdi Yacoub and Aldo R. Castaneda with the two-stage arterial switch, preceded by a PAB to retrain the left ventricle.\textsuperscript{78,79} The same technique of PAB as re-training of the left ventricle was then successfully adopted in patients with TGA with intact ventricular septum and very late referral.\textsuperscript{80}

Another group of congenital heart defects where a group of pioneers contributed to move from what it was considered “inoperable” to a standard treatment multiple-stage procedures with good long-term results was the “functionally” univentricular heart: all malformations where there is only a single ventricle with adequate size and function to support the systemic circulation. As the natural history of these malformations (hypoplastic left or right heart, tricuspid atresia, double outlet right ventricle with hypoplastic left ventricle, complete AVSD with unbalanced ventricles, etc.) was very poor, the most courageous surgeons studied how to treat these patients using the single ventricle available to sustain the systemic circulation.\textsuperscript{81}

Initially palliative procedures were applied to either to increase the pulmonary blood flow like modified Blalock-Taussig shunt,\textsuperscript{15,16,19} or to reduce the excessive pulmonary blood flow and pressure like PAB,\textsuperscript{22-29} accordingly with the specific pathophysiology of the univentricular heart, respectively with or without obstruction to the pulmonary blood flow.\textsuperscript{81}

The classic Glenn anastomosis, first clinically introduced on 1951 in Padova, Italy by CA Carlon, then popularized by WL Glenn, constituted a source of first stage towards the complete separation of the systemic and pulmonary circulation in “functionally” univentricular hearts.\textsuperscript{82,21}

Another Italian surgeon, Gaetano Azzolina, on 1972 reported the first successful end-to-side anastomosis of the transected superior vena cava to the right pulmonary artery,\textsuperscript{83} his technique allowed to maintain the continuity of the pulmonary arteries, lost in the classic Glenn anastomosis, with a bidirectional pulmonary blood flow. This technique, popularized as “bi-directional Glenn”, is in the armamentarium of pediatric cardiac surgeons as the first stage towards complete separation of the systemic and pulmonary circulations in the surgical
treatment of “functionally” univentricular hearts.\textsuperscript{22,84-85}

The complete separation of the systemic from the pulmonary circulations, using the available single ventricle to provide the systemic perfusion, was clinically reported the first time on January 1971 in Bordeaux, France, by Francis Fontan, with a right atrium to pulmonary artery connection, inserting two homograft valves.\textsuperscript{86} On July of the same year 1971 in Buenos Aires, Argentina, Guillermo O. Kreutzer successfully treated a 3-year old boy with a very similar surgical technique; he reported the case at the annual meeting of the Society of Cardiology in Argentina on August 1971, and later he published his paper with more cases.\textsuperscript{87} Several technical modifications were then introduced to what was recognized the “Fontan principle”, by deviating the entire systemic venous return directly through the pulmonary circulation, using the single ventricle for the systemic circulation. The most effective technical improvement was the construction of an intra-atrial tunnel connecting the inferior with the superior vena cava, with the transected superior vena cava connected to the inferior aspect of the right pulmonary artery, introduced almost simultaneously by Marc R. de Leval in London and Richard A. Jonas in Boston.\textsuperscript{88,89} The intra-atrial tunnel was over the decades replaced by the majority of cardiac surgeons by a technique introduced by two Italian surgeons, Carlo Marcelletti and the author of this article, who successfully applied to a first series of patients with “functionally” univentricular hearts the “extra-cardiac cavo-pulmonary connection”.\textsuperscript{90} Nowadays the extra-cardiac cavo-pulmonary connection is still the most frequently used technique to apply the “Fontan principle”, with excellent early and late results.\textsuperscript{85,91-92}

The most exasperated from of “functionally” univentricular hearts is by all means the “hypoplastic left heart syndrome”. William I. Norwood, who on 1980 in Boston reported the first successful surgical treatment with the technique, pioneered the surgical management of this extremely complex malformation.\textsuperscript{93} The Norwood operation, with technical details modified over the decades by the same Norwood, or its variations with the shunt between the right ventricle and the pulmonary artery introduced by S. Sano in Japan, are still used nowadays for the management of patients with “hypoplastic left heart syndrome”.\textsuperscript{74,94,95}

An alternative options for the treatment of neonates with “hypoplastic left heart syndrome” was introduced by another pioneer, Leonard L. Bailey, who on 20th November 1985 in Loma Linda, California, performed the first allotransplantation, using a baboon heart for a neonate with “hypoplastic left heart syndrome”.\textsuperscript{96} Within 20 years about 5000 pediatric cardiac transplantations have been recorded in the Registry of the International Society for Heart and Lung Transplantation.\textsuperscript{97}

In the current days the focus is more oriented towards genetics, neurodevelopmental outcomes, molecular medicine or nanotechnologies, mathematical models and tissue engineering.\textsuperscript{98,99,100}

Conclusions

Despite pediatric and congenital heart surgery is a relatively young specialty, the striking results obtained by the pioneers have stimulated a tremendous progress in the development of diagnostic methods, pediatric cardiac anesthesia, techniques for cardiopulmonary bypass, and specialized pediatric intensive cardiac units. All of these
allowed a substantial improvement of the overall results in the last decades.

Pediatric and congenital heart surgeons have always had a strong reputation for innovation and leadership. They often are the final step in the treatment of complex congenital heart defects, and they must shoulder that responsibility, quite frequently alone. Sometimes, however, this burden affects the role of the cardiac surgeon in the team, balanced against his or her personal ego. This is particularly true in a period where physicians are under public scrutiny more than ever before. But the characteristics often associated with the heart surgeon, persistence, tough-mindedness and strong ego, are exactly the traits required to operate inside a little human heart with a life in the balance. And the hallmarks of cardiac surgeons from the beginning of this specialty have been leadership and pioneering spirit. Pediatric and congenital heart surgery is a young discipline and it is unique, special. It is a profession combining art and science, skill and decisiveness, innovation and pioneering.

The words of Clarence Walton Lillehei when he presented at a meeting the 30-year follow-up of his original series of patient operated on with cross-circulation are better than any other example: “Finally, in covering months and even years of progress in the short time available, I have undoubtedly created several misconceptions. First, I may have made the progress reported sound easy, effortless, and unobstructed, that most certainly was not the case. There were innumerable failures, disappointments, frustrations, and obstacles, nature’s as well as man’s. The only solution was a mixture of persistence and stubbornness”.101

References


[50] Kirklin JW, DuShane JW, Patrick RT, Donald DE, Hetzel PS,


[74] Corno AF, Pozzi M. Safe innominate artery cannulation for


Viruses have known to be an important cause of asthmatic exacerbations. A cross sectional study to identify the prevalence of virus in acute exacerbation of asthma in University Malaya Medical Centre (UMMC). In this study 103 known asthmatic children between the ages of 2-12 years were analysed for presence of virus. The throat swabs and nasopharyngeal aspirates were taken and analysis was done for identification of virus. Among the children 60% had a family history of asthma, 39% allergic rhinitis and only 17% had eczema. Majority (80%) of these children were diagnosed with asthma before the age of 5. At least 70% were under follow up for their asthma, 32% in UMMC paediatric asthma clinic, 20% by private paediatricians and 17% by a general practitioner and 31% had no follow up. More than half (52%) of them had partially controlled asthma and 54% presented with moderate exacerbation of asthma. The main presenting complaints were coryza (84%) and shortness of breath (88%). About 59% of the patients were treated as out –patients. Twenty two percent (22%) had viruses detected during their exacerbation. The virus identified were mainly rhinovirus (15%), respiratory syncytial virus (5%) and bocavirus plus metapneumovirus (2%). Majority of the patients were treated as out-patients (58%) and only two patients were admitted in the paediatric intensive care unit.

Keywords: Bronchial Asthma, Exacerbation, Severity, Virus Isolation
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Email: rakheey@yahoo.com

Introduction

Asthma is an important cause of chronic respiratory disease worldwide. In the latest International Study of Asthma and Allergies in Childhood (ISAAC III), it is estimated that the prevalence of asthma in Malaysia has increased from 6.4% to 9.4 % in children aged 6-7 years and from 9% to 13 % in children aged from 13-14 years.1 Asthma control is very important in preventing asthma morbidity and mortality. As part of the Global Initiative for Asthma (GINA) guidelines in maintaining well-controlled asthma is the prevention of asthmatic exacerbations.2 Exacerbation of childhood
Viruses Associated with Acute Exacerbation of Bronchial Asthma among Children in University Malaya Medical Centre

asthma is a common acute presentation in general practices and emergency departments in the developed world. The majority of these children are not hospitalized but the exacerbation is associated with significant cost and morbidity. Despite many studies, the cause of most exacerbations of asthma remains controversial. Exacerbations can be defined as the presence of either one of the following based on the Official American Thoracic Society/European Respiratory Society Statement: Asthma Control and Exacerbations:

A definition of a mild asthma exacerbation is not justifiable with present methods of analysis, because the symptoms or changes in flow rates during these episodes will be only just outside the normal range of variation for the individual. The definition of a moderate asthma exacerbation should include one or more of the following: deterioration in symptoms, deterioration in lung function, and increased rescue bronchodilator use. These features should last for 2 days or more, but not be severe enough to warrant systemic corticosteroid use and/or hospitalization. ER visits for asthma (e.g., for routine sick care), not requiring systemic corticosteroids. The definition of a severe asthma exacerbation for clinical trials should include at least one of the following:

(a) Use of systemic corticosteroids (tablets, suspension, or injection), or an increase from a stable maintenance dose, for at least 3 days. For consistency, courses of corticosteroids separated by 1 week or more should be treated as separate severe exacerbations.

(b) A hospitalization or ER visit because of asthma, requiring systemic corticosteroids.

In children, most of the exacerbation is associated with viral infections and these are probably the most difficult to treat as these exacerbations are not responsive to oral corticosteroids. Respiratory viruses are known major contributor to morbidity and mortality worldwide. Recent work in asthma has implicated human rhinoviruses as an important cause of asthmatic exacerbations, but a variety of respiratory viruses are known to cause acute respiratory infections, including the common cold, bronchiolitis and pneumonia in humans. The major pathogens that are known to be responsible are Respiratory Syncytivirus (RSV), Human Rhinovirus (HRV), Human Metapneumovirus (HMPV), Human Parainfluenza virus (HPIV), Enterovirus (EV), Influenza viruses (InfV), Adenoviruses (AdV), and Human Boca virus (HBoV). The mechanisms responsible for viral-induced exacerbations remain uncertain. Proposed mechanisms include direct infection of the lower respiratory tract, the inflammatory response to viruses, increases in bronchial responsiveness and up-regulation of intercellular adhesion molecule-1 expression in bronchial epithelium.

Respiratory viruses are also well recognized as major triggers of acute exacerbations of asthma in children and adults, resulting in frequent outpatient visits and hospitalisations. Although a connection between upper respiratory infections and asthma has long been recognised, the potential importance of the association was probably underestimated until relatively recently when it was shown that 85% of asthma attacks in children and 44% in adults
Viruses Associated with Acute Exacerbation of Bronchial Asthma among Children in University Malaya Medical Centre

are precipitated by upper respiratory infections.\textsuperscript{10,11} An increasing body of evidence supports the hypothesis that these infections cause a greater degree of morbidity in asthmatic subjects than in the healthy population, emphasizing a discrepancy in the antiviral response of asthmatics.\textsuperscript{12} There is very little published data regarding the presence of different types of viruses in asthmatic children in Malaysia. The objective of this study is determine the types of viruses implicated in acute exacerbation of bronchial asthma in children presenting to University Malaya Medical Centre (UMMC) and to determine if there was an association between virus isolation and the severity of asthmatic exacerbation.

Materials and methods

A cross-sectional study conducted over a one year period, from November 2010 until November 2011 in University Malaya Medical Centre (UMMC). All children between the ages of 2 years to 12 years with acute exacerbation of bronchial asthma in the Paediatric Trauma & Emergency (UMMC), General Paediatric Wards and Paediatric Intensive Care Unit of UMMC were included in the study. A face to face interview using a questionnaire was used in the study and convenience sampling was used in the selection of the patients. One hundred and three (103) patients were interviewed and throat swab samples for virology were collected from all of them. The sample size calculated was 84 patients using a confidence level of 95\%, margin of error 10\%, population size of 624 and response distribution 50\%. The inclusion criteria were all children between 2 to 12 years of age with acute exacerbation of bronchial asthma who had been previously diagnosed with bronchial asthma and the exclusion criteria was children below 2 years or above 12 years of age, children whose parents or guardians refused consent for the study and also children diagnosed with asthma but presenting for other reasons without any exacerbation of asthma.

For children above 6 years old a nasal and throat swab was taken by the doctor. For the younger children a nasopharyngeal aspirate was taken by the nurses during suction. Only sterile Dacron/polyester swabs with plastic shafts were used. Calcium alginate swabs or swabs with wooden sticks were not used as they could contain substances that inactivate some viruses and inhibit PCR testing. Staff nurses conducted the suction and aspiration of nasopharyngeal aspirations using the routine sterile method with suction tubing connected to a mucous extractor and a suction pump with pressure of 50-100 mmHg. The samples were sent to the virology laboratory for identification.

Statistical analysis was carried out using SPSS version 20 (PASW) and Microsoft Excel database. A p value of < 0.05 was taken as significant. Descriptive analysis was performed on the data that was obtained and Chi square test was used to determine association between categorical variables.

Results

During the study period there were 767 number of visits for asthma exacerbations in children between 2-12 years range in the UMMC Paediatric Trauma & Emergency Unit and the wards. Overall there were a total of 624 patients seen and only 124 patients were recruited for the study using a convenience sampling. However the data from 21 children was incomplete and so only 103 children were included in the
study. Most of the patients were Malays 76 (74%), followed by Indian 18 (17%) and the Chinese were 9 (9 %). There were more males 60 (59%) than females 43 (41 %).

About 48% were between 2-5 years of age, 30% were 6-9 years of age and 22% were 10-12 years of age. Only 42 (41%) of these children were ever breast fed and 56 (54%) had at least one parent who smoked.

Figure 1. Atopy among Immediate Family members of the patient

<table>
<thead>
<tr>
<th></th>
<th>Father</th>
<th>Mother</th>
<th>Sibling</th>
<th>&gt;1 family member</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eczema</td>
<td>0</td>
<td>8%</td>
<td>10%</td>
<td>17%</td>
<td>84%</td>
</tr>
<tr>
<td>Allergic rhinitis</td>
<td>16%</td>
<td>15%</td>
<td>8%</td>
<td>29%</td>
<td>71%</td>
</tr>
<tr>
<td>Asthma</td>
<td>20%</td>
<td>22%</td>
<td>36%</td>
<td>59%</td>
<td>41%</td>
</tr>
</tbody>
</table>

The family history of atopy such as asthma, allergic rhinitis and eczema in the immediate family members of the index patients showed that 59% of patients had more than one family member with asthma, 29% with allergic rhinitis and 17% with eczema.
Table 1. Family history of atopy

<table>
<thead>
<tr>
<th>History of atopy</th>
<th>p value</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asthma</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Father</td>
<td>0.86</td>
<td>0.92 (0.21-4.16)</td>
</tr>
<tr>
<td>Mother</td>
<td>0.68</td>
<td>1.61 (0.42-6.19)</td>
</tr>
<tr>
<td>Sibling</td>
<td>0.47</td>
<td>0.79 (0.17-3.65)</td>
</tr>
<tr>
<td>&gt;1 member</td>
<td>0.60</td>
<td>1.00 (0.42-2.37)</td>
</tr>
<tr>
<td>None</td>
<td>0.60</td>
<td>0.91 (0.14-6.14)</td>
</tr>
<tr>
<td>Allergic rhinitis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Father</td>
<td>0.48</td>
<td>0.21 (0.02-1.76)</td>
</tr>
<tr>
<td>Mother</td>
<td>0.23</td>
<td>0.76 (0.09-5.88)</td>
</tr>
<tr>
<td>Sibling</td>
<td>0.37</td>
<td>0.22 (0.02-2.39)</td>
</tr>
<tr>
<td>&gt;1 member</td>
<td>0.64</td>
<td>1.81 (0.65-5.05)</td>
</tr>
<tr>
<td>None</td>
<td>0.64</td>
<td>0.12 (0.01-1.43)</td>
</tr>
<tr>
<td>Eczema</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Father</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Mother</td>
<td>0.89</td>
<td>-</td>
</tr>
<tr>
<td>Sibling</td>
<td>0.04</td>
<td>-</td>
</tr>
<tr>
<td>&gt;1 member</td>
<td>0.13</td>
<td>0.29 (0.07-1.15)</td>
</tr>
<tr>
<td>None</td>
<td>0.14</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 1 shows that asthma was the most common atopic condition amongst family members. However, family history of atopy was not associated with severity of asthmatic exacerbation as can be seen in the table below (p>0.05).

Figure 2. Age at diagnosis of asthma
Figure 2 illustrates the age at first diagnosis of asthma in index patients. About 80% of the patients were diagnosed before the age of five years. There was only one patient diagnosed at one year of age and that patient had a strong family history of asthma with a history of recurrent wheezing in infancy. Only 21% of patients were diagnosed after the age of five years.

Overall, 69% had minimal follow up, whether it was with a general physician or private paediatrician. About one third (32%) of the patients had regular follow up in the UMMC paediatric asthma clinic. Thirty one percent (31%) of patients did not have any follow up and some of these patients bought the asthma medications regularly from private pharmacist, practicing a self-care.

In terms of asthma control about 29% were controlled, 52% were partly controlled and 19% were uncontrolled. Most of the patients were from the partly controlled group with less than one third being controlled. It was noticed that 22% of patients were seen with acute exacerbation of asthma. Majority (78%) of the patients had no virus detected but virus was detected in 22% of the patients. Rhinovirus was detected in 15%, RSV in 5% and bocavirus with human metapneumovirus in 2%. Interestingly, both cases of bocavirus had co-infection with human metapneumovirus.

**Figure 3. Virus isolation over the various ages**

![Figure 3](image)

Figure 3 shows that rhinovirus is present throughout the different ages in childhood. Whereas RSV was only seen in children below the ages of six, the combination of Bocavirus with human metapneumovirus was seen in two children, two and six years old.
Figure 4. Virus isolation and severity of exacerbation

Figure 4 describes the severity of exacerbation for each virus isolated. The two patients with combined bocavirus and human metapneumovirus both were of the mild category. Rhinovirus had mostly moderate severity but two of the six patients with severe exacerbation had rhinovirus isolated. RSV was associated with mainly moderate exacerbations of asthma (n=4).

Patients were asked about the presenting complaints during these asthmatic exacerbations. Although none were significantly associated with severity of asthma about eighty four percent (84%) of patients complained of cough and cold (coryzal symptoms) (Table 2).

Table 2. Presenting symptoms during current asthma attack

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Yes</th>
<th>No</th>
<th>P value</th>
<th>OR (CI 95%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever</td>
<td>49 (48%)</td>
<td>54 (52%)</td>
<td>0.75</td>
<td>1.14 (0.49-2.63)</td>
</tr>
<tr>
<td>Coryza</td>
<td>86 (84%)</td>
<td>17 (16%)</td>
<td>0.84</td>
<td>0.89 (0.29-2.74)</td>
</tr>
<tr>
<td>Shortness of breath</td>
<td>91 (88%)</td>
<td>12 (12%)</td>
<td>0.83</td>
<td>0.87 (0.25-3.02)</td>
</tr>
<tr>
<td>Wheeze</td>
<td>58 (56%)</td>
<td>45 (44%)</td>
<td>0.31</td>
<td>0.65 (0.29-1.48)</td>
</tr>
<tr>
<td>Diarrhoea</td>
<td>4 (4%)</td>
<td>99 (96%)</td>
<td>0.25</td>
<td>3.97 (0.376-41.99)</td>
</tr>
<tr>
<td>Vomiting</td>
<td>11 (11%)</td>
<td>92 (89%)</td>
<td>0.90</td>
<td>0.92 (0.24-3.47)</td>
</tr>
</tbody>
</table>

Most of the patients (73) said that the cause of their current asthma exacerbation was an upper respiratory infection which related to the coryzal symptoms reported by patients as their chief complaint. The second most common trigger reported was cold weather or cold drinks. Only 5% of patients had exercise induced exacerbations.
More than half (58%) of the patients were discharged from the Paediatric T & E Unit after presenting with exacerbation of asthma. Among those admitted 43 (42%), only two patients were admitted to the paediatric intensive care unit for 3 and 4 days respectively. There were no deaths noted among patients admitted.

Chest X rays were done for 32 (82%) patients. Of those done, 9 (8%) were reported normal, 19 (18%) reported as pneumonia and 2 (2%) with bronchiolitis.

**Discussion**

This study identifies viruses isolated from children presenting with acute exacerbation of bronchial asthma in UMMC. Although there no such studies in Malaysia similar studies have been done overseas. In this study 80 % of the children were diagnosed with asthma before the age of 5 years and only 29% of them were controlled. It was also noticed that 59% of the children had at least one member of the family who had asthma. About one third (32%) had regular follow up and about one third of them (31%) had no follow up at all. Viruses were isolated in 22% of the patients who presented with acute exacerbation of asthma. However the presence of virus in other studies was much higher (51% and 53%) as reported elsewhere.

The low pick up rate in this study could be due to convenience sampling and the smaller patient population in this study. Rhinovirus was seen in 15%, RSV was seen in 5% and Bocavirus with human metapneumovirus in 2%. In other studies the presence of rhinovirus was much higher 35%, 52%, 40% and 63% .

Bocavirus is a new virus that has recently been found to be associated with asthmatic exacerbations. It was also noticed in this study that rhinovirus was seen in the whole age range (2-12 years) whereas RSV was seen only in children below 6 years. In terms of severity, those patients infected with rhinovirus showed moderate to severe asthmatic exacerbations. The presenting complaint of these patients was mainly coryza (84%). Majority of the patients were treated as out-patients (58%) and only two patients were admitted in the paediatric intensive care unit. Viral isolation among patients with asthma exacerbations did not predict severity and outcome of asthma exacerbation in this study.

**Conclusion**

Twenty two percent of children with asthma exacerbation in UMMC were associated with viral infections (p >0.05). At least 70% were under follow up for their asthma, and 31% had no follow up. More than half (52%) of them had partially controlled asthma and 54% presented with moderate exacerbation of asthma. The virus identified were mainly rhinovirus, respiratory syncytial virus, and bocavirus with metapneumovirus.

**Acknowledgement**

I would like to thank Assoc Prof Dr Jessie De Bruyne, Assoc Prof Anna Marie Nathan, Prof Jamal I-Ching from University Malaya for all the help rendered during the preparation of the study and to Dr Tan Kok Leong who helped me with statistics. Finally thanks also to Faizatul Lela Jaafar, Ardalinah Hassan and Siti Sarah Nor’E of the Virology Department of University Malaya who helped in analysing the samples.
References


[16] Heymann PW, Platts-Mills TA, Johnston SL. Role of viral
Viruses Associated with Acute Exacerbation of Bronchial Asthma among Children in University Malaya Medical Centre


ADHERENCE TO MAJOR STANDARD PRECAUTIONS:
AN AUDIT OF VENEPUNCTURE AND INTRAVENOUS
CANNULA INSERTION IN THE PAEDIATRIC UNIT OF
HOSPITAL SULTANAH AMINAH, JOHOR BAHRU

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Thye Y Tan³, Juliana Chua⁵, Mohd Nizam Mat Bah⁶

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5. Queen Elizabeth Hospital, South Australia, Australia
6. Department of Paediatrics, Sultanah Aminah Hospital, Johor, Malaysia

Abstract

Background: There are numerous guidelines regarding universal standard precautions that aim to reduce the risk of cross-infection and needle stick injury in procedures like venepuncture and intravenous cannulation. The success of these guidelines is dependent on the adherence of health personnel to their recommendations. Objective: To carry out an audit on the extent of pre-procedure preparation and adherence to standard precaution measures in venepuncture and intravenous cannulation in the Paediatric unit of a Malaysian tertiary hospital.

Study population and methods: A prospective clinical audit targeting personnel who performed venepuncture and/or intravenous cannulation in the Paediatric unit of a tertiary hospital in Johor, Malaysia. The audit took place between 22nd of March 2011 to 6th of May 2011. Results: There were a total of 91 procedures being observed during the audit period, including 69 venepunctures (75.8%) and 22 intravenous cannulations. The procedures were performed mainly by the doctors (90.1%). The lowest adherence rate to standard precaution was observed in the criterion of hand washing (20.9%), followed by hand gloving of the main and supporting hand (both 35.2%), timely disposal of sharps (65.9%) and preparation of post-procedure dressing or tape to secure the cannula in place (67.0%).

Conclusions: The rates of adherence to standard precautions were generally low during the performance of venepuncture and intravenous cannulation. A clear guideline on the steps of standard precaution should be made available in the procedure rooms to provide guidance during the performance of these procedures.

Keywords: Standard Precaution, Venepuncture, Intravenous Cannulation, Audit

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Adherence to Major Standard Precautions: An Audit of Venepuncture and Intravenous Cannula Insertion in the Paediatric Unit at Hospital Sultanah Aminah, Johor Bahru

Introduction

Standard precautions in health care, developed and disseminated by the World Health Organization (WHO) cover a set of guidelines relating to the appropriate hygiene practice for health care workers who are in contact with patients. The adherence to the standard precaution measures is crucial in preventing the transmission of health care associated infections, for example blood-borne infections like HIV, hepatitis and other infections acquired through contact.1,2 Standard precautions are incorporated into the core curricula of health care disciplines in medical schools, either in clinical skills teaching or in dedicated modules such as patient safety. The awareness and practice of standard precautions are usually reinforced in health care institutions such as hospitals and clinics around the world, with adherence to standard precautions measures taken as a major indicator for the overall quality of service. We performed a preliminary prospective clinical audit in the Paediatric wards to evaluate the rates of adherence to the established criteria of standard precaution during venepuncture and intravenous cannulation using a proforma that we developed specifically for this project. The rationale for this audit was the increasing incidence of contaminated blood culture results among paediatric patients that delayed directed therapy, as well as the increasing incidence of needle stick injuries among the healthcare workers.

Methods

This is a preliminary project in the form of a prospective clinical audit conducted in the Paediatric unit of Hospital Sultanah Aminah, Johor Bahru, Malaysia. The audit took place between 22nd of March 2011 to 6th of May 2011. Our target personnel were the medical and nursing staff who performed venepuncture and/or intravenous cannulation. While the aim of venepuncture and cannulation was to achieve a full adherence (100%) to all standard precaution measures that were relevant to the procedures being performed, we set an expected standard of at least 90% to all measures for the purpose of this audit. The audit project was approved as part of the standard curricular requirements for final year students of Monash University Sunway Campus. It was also approved at the hospital and departmental level as part of the departmental quality improvement activities. As this was a preliminary audit project with a new dedicated proforma, and there was no personally identifiable information used, no direct contact with any human subject and no access to any clinical data throughout the audit, we did not obtain further ethics approval from the institutional or national review board.

During the audit period, students-researchers observed the procedures in the ward(s) that they were posted to in their final-year Paediatric posting. These observations were made predominantly during office hours between 8.00 a.m. to 5.00 p.m. during which their scheduled learning activities took place. We did not perform a sample size estimate as this was a preliminary study and there was no published studies that evaluated the same subject as a reference for our outcome estimates. We therefore employed convenience sampling method in which we observed any procedure performed by personnel who were on duty during the student researchers’ attachment period and timing. However, we performed a post-hoc power analysis using our available sample. Taking our expected audit standard of 90% compliance rate, our
A sample of 91 observations provided a power of 0.9993 with a one-sided significance level of 0.05 (Stata 10).

Subjects of the audit were all health personnel who performed a venepuncture or intravenous cannulation in the Paediatric unit within the study period, from senior nursing staff to paediatricians. They were not differentiated based on their level of expertise or experience as we deemed that conformity to major standard precautions did not require any particular skill set or experience; only knowledge of these steps were essential. The target participants were unaware that they were being observed. We used a 15-item, anonymised proforma for the audit. The items in the proforma, taken from the published guidelines from the World Health Organisation (WHO) 1-3, included general information (three items), steps in preparation (five items) and procedure (seven items). A detailed list of the items is provided in Figure 1. The data collectors discussed beforehand on what constituted an acceptable practice on each criterion listed in the proforma before commencing the audit. We completed one proforma for each procedure performed and collated the data into an electronic spreadsheet, through which we performed only standard descriptive statistics (Microsoft Excel version 2010).

**Figure 1. Criteria on standard precaution measures**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Yes (Tick) / No (Cross)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Place observed</td>
<td></td>
</tr>
<tr>
<td>Venepuncture/IV cannulation</td>
<td></td>
</tr>
<tr>
<td>Who performed the procedure</td>
<td></td>
</tr>
<tr>
<td><strong>Preparation</strong></td>
<td></td>
</tr>
<tr>
<td>Needle/cannula</td>
<td></td>
</tr>
<tr>
<td>Alcohol wipe/cotton with alcohol</td>
<td></td>
</tr>
<tr>
<td>All required blood bottles</td>
<td></td>
</tr>
<tr>
<td>Cotton gauze to stop bleeding</td>
<td></td>
</tr>
<tr>
<td>Plaster/cotton with tape for post-procedure dressing OR tape to secure cannula in place</td>
<td></td>
</tr>
<tr>
<td><strong>Procedure</strong></td>
<td></td>
</tr>
<tr>
<td>Wash hands</td>
<td></td>
</tr>
<tr>
<td>Glove hands that holds needle/cannula</td>
<td></td>
</tr>
<tr>
<td>Glove supporting hand</td>
<td></td>
</tr>
<tr>
<td>Prepare and clean area of procedure</td>
<td></td>
</tr>
<tr>
<td>Not recapping needle ever during the procedure</td>
<td></td>
</tr>
<tr>
<td>Dispose of sharps to the sharps bin at the earliest possible time</td>
<td></td>
</tr>
<tr>
<td>Cleaning up spillage of blood or bodily fluids</td>
<td></td>
</tr>
</tbody>
</table>
Figure 1 shows the criteria on standard precaution measures during the preparation and performance of venepuncture or intravenous cannulation as listed our audit proforma. Data collectors were required to place a tick (“achieved”) or a cross (“not achieved”) in the allocated spaces that corresponded to each item in the proforma.

**Results**

We observed 91 procedures in total during the period of audit, including 69 venepunctures (75.8%) and 22 intravenous cannulations. Eighty two procedures (90.1%) were performed by doctors and the remaining eight by nurses. Each procedure was assessed using the full proforma except for 4 instances of IV cannulations as they were placed for purposes of IV medication or fluid therapy and did not require any blood bottles.

The adherence rates to the standard precaution measures ranged from 20.9% to 100%. There was only one item with 100% adherence rate, which is the preparation of needle and/or cannulae before the procedure (Figure 2). In general, adherence to standard precaution measures was higher in preparation than the actual performance of the procedures. For instance, in all but one item in the preparatory steps, the rates of adherence were 89% or higher (Figure 2), while during the actual performance of the procedures, only three out of seven items had adherence rates of higher than 90% (Figure 3). Overall, the lowest adherence rates were observed in hand washing (20.9%), hand gloving of the main and supporting hand (both 35.2%), timely disposal of sharps (65.9%) and preparation of post-procedure dressing or tape to secure the cannula in place (67.0%) (Figure 4).

![Figure 2. Pre-procedure preparation](image)

*Note: There were 4 samples where blood bottles were not required.*
Adherence to Major Standard Precautions: An Audit of Venepuncture and Intravenous Cannula Insertion in the Paediatric Unit at Hospital Sultanah Aminah, Johor Bahru


Discussion

This audit shows that the rates of adherence to standard precaution measures were generally high during preparation but low during the actual performance of...
venepuncture and/or intravenous cannulation in the Paediatric unit in Hospital Sultanah Aminah, Johor Bahru, Malaysia. Notably, only one step out of twelve evaluated had a full adherence rate. The findings raise concerns as the observed suboptimal compliance to standard precaution during the practical procedures could have contributed to hospital associated infections. On a separate note, the ratio of doctors performing the procedures compared with nurses was around 10:1. This was not intentional and only reflects the fact that these procedures were more frequently performed by doctors than nurses during the audit period. Furthermore, only senior nurses were allowed to perform these invasive procedures in the Paediatric unit, thus contributing to this ratio.

Nosocomial infection affects up to 26% of patients in intensive care units. Poor hand washing techniques has been attributed as the most important factor for spreading nosocomial infections in in-ward patients. Hand washing is strongly advocated in the WHO and Malaysian Ministry of Health guidelines for infection control while handling body fluids or gaining intravenous access. Compliance to handwashing guidelines, such as those published by Centers for Disease Control, can considerably reduce the rates of infection. However, healthcare workers’ compliance with such guidelines rarely exceeds 40% and this was considered to be among the biggest challenges in implementing standard precaution measures. The consequences of poor hand-hygiene practice have been well-documented. A case control study by Arvelo et al showed an association between cases of diarrhoea outbreaks and lack of hand washing. Similarly, a review by Todd et al stated that both enteric and respiratory diseases are easily spread where hand hygiene is not carried out effectively. Non-compliance to hand hygiene thus presents a major challenge for clinical governance as it is associated with prolonged hospital stays and consumption of scarce hospital resources. This is evidenced by a study using simulation models by Cummings et al which concluded that hand hygiene non-compliance is associated with significant hospital costs whereby substantial savings can be made by minimal improvements in compliance.

This study showed that hand washing and gloving and early sharps disposal were the three precaution measures with the highest rate of non-compliance. Although no formal survey of reasons for non-compliance of these steps were performed due to the need to maintain the anonymity of the audit, casual feedback found time constraints, measures deemed as unnecessary and may even affect procedure performance, and skin reaction to hand wash solutions as some reasons for non-compliance to hand washing and gloving. Besides that, young patients were generally uncooperative, especially during painful intravenous cannulation, thus a number of doctors quoted that it is more important to secure the cannula first before disposing the sharps due to the risk of a distressed child pulling the cannula out. In other studies, specific reasons for not washing hands at appropriate times include lack of knowledge of the risks of non-compliance to hand washing to the patients, a lack of motivation, time pressure, inadequate products or dispensers, lack of accountability, skin irritation and poor model role of chief-of-staff or senior physicians. In regards to non-compliance to hand gloving, a local study by Lee et al. found that reasons for it include being uncomfortable wearing gloves (14.1%), in a hurry (11.3%), unnecessary because patient
was not a blood-borne pathogen carrier (4.2%), not being able to palpate the pulses (4.2%), lazy (1.4%), allergic to rubber gloves (1.4%), no available gloves and no gloves of suitable size (1.4%). These reasons are particularly important as just knowledge of standard precautions did not have a significant effect on reducing needle-stick injuries, rather it is the compliance during clinical practice. It was shown that even 84.2% of healthcare workers with good or very good knowledge of standard precautions still had needle-stick injuries. Interestingly, although there is a significant difference in knowledge of standard precautions between a medical officer and a house officer (36.22 vs. 34.23, \( P = 0.0001 \)) there was no significant difference in the prevalence of needle-stick injuries with respect to the duration of clinical practice experience (\( P = 0.69 \)) or mean working hours in the week. This trend was also observed among final year medical students of Malaysian medical universities who spent varying amounts of time performing such procedures; compliance to standard precaution protocol was the only factor shown to be significantly lower in students with needle-stick injuries (\( P < 0.05 \)), and not the amount of time spent performing procedures.

As a change in behaviour after years of performing a procedure is difficult, early intervention during training is essential. An important aspect of intervention is education on recognizing situations where hand washing is important. Regular motivational campaigns at the workplace as well as standardized training programs are relevant additional measures. Training alone however is not sufficient for long-lasting improvement. Multiple-activity strategies must also include motivation of employees by use of peer pressure on noncompliant co-workers, a reward and/or penalty system. Role modelling has been shown to have a major influence in the practice of hand hygiene in an institution. According to a study by Creedon et al, implementation of a multifaceted interventional hand hygiene programme which included periodic practice audits and performance feedback as well as poster campaign and educational handouts resulted in an overall improvement in compliance with hand hygiene guidelines.

Since the AIDS epidemic outbreak in year 1987, hospital staffs have taken multitudinous steps to enhance infection control; amongst them is gloving. The usage of gloves in the United States has increased from 1.4 billion pairs in 1988 to 8.3 billion pairs in 1993. Due to the decrease in the incidence of transmission of this virus via this measure, gloves have been advocated to be the key to reduce transmission of other infections, either from the patients to the healthcare workers or vice versa and also cross infection where healthcare workers act as a vector to infections between patients. The effectiveness of this measure has been supported by Tenorio et al. This study reports a significant decrease in the number of vancomycin-resistant enterococcus species on the hands of gloved healthcare workers compared to non-gloved healthcare workers after examination of the infected patients. Coupled with the fact that up to 50% of enterococcal infection in the paediatric age-group is fatal, gloving is an imperative measure. The Centers for Disease Control (CDC) study and Doebbeling et al study demonstrate consistent results with other pathogens. In terms of needle-stick injury and gloving, Collins et al has reported that gloving does not decrease the rate of needle-stick injury but it reduces the risk of transmission of blood-borne pathogens. This protects the
healthcare workers from potentially fatal diseases that affect the paediatric age group. However, a study by Kinlin et al, which was conducted more recently, has shown that gloving also reduces the risk of needle-stick injury.26 Proper handling of sharps consists of immediate disposal, or as soon as possible, into an approved container without recapping or handing off to another person. Timely disposal of sharps is important in an effort to prevent needlestick injuries.27 Suboptimal training and practicality may account for some reasons as to why proper sharp disposal regulations are not fulfilled.28 In particular, placing the sharps containers away from where IV lines are placed may have contributed to the non-compliance among health personnel. To reduce or eliminate the need for the health personnel to move through the immediate patient environment with unsheathed needles, multiple needle-disposal containers should be placed within reach of the point of use. A study published in the American Journal of Infection Control in 1994 found that installation of needle-disposal containers near patients’ beds has been found to decrease the reported number of needlestick injuries.29

We acknowledge the following limitations in our audit. First, we did not examine the association of the observed practice to the clinical outcomes such as the rates of infection, hence we could not conclusively claim that the observed practice had major impacts on patient care in our particular setting. Besides, our sample was too small to enable a meaningful evaluation of each procedure separately. Next, we did not identify the personnel involved, and so we could not account for possible effects of the same person performing multiple procedures and meaningfully compare the performances of different staff categories. Additionally, we did not assess the performance if these procedures after office hours, during which the adherence to standard precautions might be different compared to that in the office hours.

Conclusions

There is room for improvement in the staff performance in the Paediatric unit with regards to their adherence to standard precaution measures when performing venepuncture or intravenous cannulation. A practical recommendation from this audit is to incorporate the WHO checklist for standard precaution measures, similar to our audit proforma, in the procedure rooms to provide a step-by-step guide to the personnel involved during the preparation and performance of venepuncture and/or intravenous cannulation, alongside continuing education on the importance of standard precaution measures with regular surveillance on hospital associated infections in the unit. A follow-up audit with a larger sample size that incorporates sufficient number of procedures performed by staff of different categories and at different timing should be performed to evaluate the change in practice following the implementation of the recommendations.

Acknowledgement

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Conflict of interests

The authors declare no conflict of interests.

References


[14] Lee LK, Noor Hassim I. Implication of the Prevalence of Needlestick
Adherence to Major Standard Precautions: An Audit of Venepuncture and Intravenous Cannula Insertion in the Paediatric Unit at Hospital Sultanah Aminah, Johor Bahru


[26] Kinlin LM, Mittleman MA, Harris AD, Rubin MA, Fisman DN. Use of gloves and reduction of risk of injury caused by needles or sharp


ORIGINAL ARTICLE

INCONTINENTIA PIGMENTI IN A NEONATE WITH SEIZURES IN HOSPITAL TUANKU JA'AFAR, MALAYSIA

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Abstract

Incontinentia Pigmenti (IP) or Bloch-Sulzberger’s syndrome is a rare X link dominant neurocutaneous syndrome that mainly affects female. A baby girl was admitted to the Special Care Nursery (SCN), Hospital Tuanku Ja’afar (HTJ) at day seven of life for jaundice but noted to have vesiculobullous lesion over the limbs and trunk and subsequently readmitted at day twenty two of life for seizures. The vesiculobullous lesions evolved into verrucous and hyperpigmentation along the Blaschko’s lines. The computed tomography (CT) of the brain showed evidence of cerebral infarct which is consistent with the diagnosis of IP.

Keywords: Incontinentia Pigmenti, X-link Dominant, Seizures

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Introduction

All mammalian species feed their newborn infants with their own milk for them to grow and survive. However, unlike other mammals, human mothers have challenged this natural behaviour by giving other milk, food or drink to their infants. It was driven partly by the belief that they cannot produce enough breast milk to meet their infants’ needs. While trying to satisfy their infants, mothers feed them with other foods or drinks in addition to breast milk. It is obviously not following the globally accepted recommendation of exclusive breastfeeding for the first six months of an infant’s life. During that period, an infant should receive only breast milk, without any additional solid or liquid, except for oral rehydration salt, drops, syrups of vitamins, minerals or medicines.\(^1,2\)

Various researches have proven the benefits experienced by infants and mothers who practised breastfeeding compared to those who do not.\(^3,6\) Interestingly, those benefits are dose-dependent, with infants who breastfeed longer and more exclusive demonstrating greater reductions in diseases, especially gastrointestinal infection, pneumonia and recurrent otitis media.\(^7,8\) In addition, a review of two randomized controlled trials found giving additional water or glucose water had no benefits to newborn infants, and it was associated with increased risk of early cessation of breastfeeding.\(^9\) Those findings support the above recommendation of exclusive...
breastfeeding in the first six months of life. However, it is still not optimally practised by mothers in many part of the world, including Malaysia. A nationally representative data allows for comparison of exclusive breastfeeding below four months, and it shows a decreasing trend, from 29.0% in 1996 to 19.3% in 2006, with only 14.5% infants below six months received exclusive breastfeeding. Thus, it is important to understand why those mothers do not follow the recommendation. Cultural beliefs, myths and ignorance are among the factors contributing to low breastfeeding practice in Malaysia, as commented by the Ministry of Health’s Family Health Development Director. Among them is the belief that breastfed infants need water in addition to breast milk during the first six months of life. There are mothers who avoid giving formula milk because they know breast milk is the best, but they do not know nor convince that it is all the infants need, not even water. The National Health and Morbidity Survey conducted in 2006 found 19.7% of infants between the ages of two to three months were given breast milk but added with plain water. However, non-milk liquids or fruit juice was not commonly given to those below two years old.

Therefore, to improve exclusive breastfeeding practice, it is important to deliberate on this issue. A qualitative research allows for a detail exploration of the mothers’ views, beliefs and understanding. One of the qualitative research techniques to collect data is focus group discussion (FGD), involving interaction and discussion among group members to learn more about their feelings and opinions. This study aims to explore pregnant women’s beliefs and experiences regarding the practice of giving plain water to infants below six months of age, to gain insights into the factors influencing exclusive breastfeeding practices in Kelantan, Malaysia.

**Methods**

This qualitative study used phenomenology as the methodological framework. A phenomenological study aims to ‘understand and describe the participants’ experiences of their everyday world as they see it’. It was conducted from April to June 2011 among pregnant women attending the governmental health clinics in the district of Pasir Mas, Kelantan. A written approval was obtained prior to the study from the Research Ethics Committee of both the Ministry of Health and Universiti Sains Malaysia. Women who were pregnant regardless of their gestational age, having their antenatal follow-up at the governmental health clinics, have had at least one previous live birth and were not having any disease or condition medically known to be contraindicated to breastfeeding were eligible for the study. Those who were not able to communicate in Malay language were excluded. The district health officer identified three health clinics from where the participants for the study were selected. The selection was based on health clinics with available facilities to conduct a group discussion.

The participants from the three health clinics were recruited through a stratified purposive sampling based on their occupational status. Method for data collection used in this study was FGD. It uses the group interaction to learn more about their thoughts and opinions. The staff at the corresponding health clinics identified a group of six to eight housewives, as well as another group of working mothers. They were contacted by the researcher to explain about the study and a meeting date agreeable by all the group
members was set. A theme list was developed to remind the moderator of the issues to be discussed. It covered the participants’ views about feeding plain water to infants below six months of age, their beliefs, feelings and previous experiences.

A moderator, a note-taker and an assistant were present during each FGD, which was conducted at the meeting rooms in the health clinics. Before starting the FGD, the moderator explained about the conduct of the FGD and the participants’ roles, and obtained written informed consent from the participants. Once started, the discussions were recorded by the note-taker by writing and audio-recording. At the same time, the note-taker also noted and recorded any non-verbal cues during the FGDs.

Each FGD was analysed before conducting other FGD with another group of participants. The thematic analysis started with development of a transcript, produced by the note-taker when she transcribed verbatim the discussion. The transcript was then verified by the researcher who moderated the FGD. It was read through repeatedly, and the researcher annotated and coded the transcript. Themes and categories were identified from the FGD. The process was repeated for the following FGDs. Similar themes and categories from the different FGDs were collected and the differences were recorded. The process continued until data saturation was achieved, and no new data was developed.

In order to strengthen the credibility of the research, the study attempted to achieve methodological triangulation. It refers to a convergence of information from multiple sources to corroborate the data and evolving themes. Thus, two in-depth interviews (IDIs) were conducted with pregnant women who were not involved with the initial FGDs. The interviews were based on similar theme list used in the FGDs, and they were also audio-recorded and transcribed verbatim. Coding, themes and categories derived from the IDIs were identified and compared with those achieved from the FGDs.

Results

There were four FGDs with a total of 28 participants involved in the study. Two groups consisted of housewives and another two groups were working mothers. They were teachers, nurses, clerks, shop assistants and businesswomen. In addition, two housewives aged 33 and 43 years old were involved in the IDIs. Table 1 shows the socio-demographic characteristics and breastfeeding experiences of 27 participants. One participant did not return the personal form, thus her information was not included in Table 1.

Table 1. Socio-demographic characteristics and breastfeeding experience of FGD participants (n=27)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean (SD)</th>
<th>Freq (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (year)</td>
<td>34.4 (5.25)</td>
<td></td>
</tr>
<tr>
<td>Duration of education (years)</td>
<td>11.5 (2.10)</td>
<td></td>
</tr>
<tr>
<td>Occupational status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Housewife</td>
<td></td>
<td>13 (48.1)</td>
</tr>
<tr>
<td>Working</td>
<td></td>
<td>14 (51.9)</td>
</tr>
<tr>
<td>Age of husband (years)</td>
<td>38.7 (5.52)</td>
<td></td>
</tr>
<tr>
<td>Duration of husband’s education (years)</td>
<td>10.8 (1.86)</td>
<td></td>
</tr>
</tbody>
</table>
Analysis of the FGDs and IDIs identified an important theme: ‘Everybody gives plain water to their infants before six months of age’. Almost all participants believed that every mother fed their infants with water, particularly plain water. They even accepted and agreed with the practice. Four categories in relation to the theme were developed from the analysis, and they were as followed:

i) The practice of giving plain water
All participants who were working mothers claimed that they gave plain water to their previous infants in the first six months of life. Interestingly, nurses were also among those who did so. The participants started to introduce plain water very early in their infants’ life. Many of them had given plain water while they were still in the post-natal ward. Some of them stated as below:

“Orang beri belaka air”, KL, housewife, FGD.

“Jururawat dekat rumah saya pun beri air masak, semasa dalam wad lagi selepas bersalin (my neighbour who is a nurse also gives water, even in the ward after delivery)”, Z, housewife, FGD.

“...sebab di hospital pun, macam lepas bersalin, mesti ada botol susu untuk beri air masak (...because after delivery in hospital, there must be bottles for feeding baby with plain water)”, A, housewife, FGD.

“Tak tahulah ada ke orang yang tak beri air masak sampai enam bulan, tapi kebanyakkannya bagilah (I do not know if there is anybody who do not give plain water until six months, but mostly people give)”, Z, housewife, IDI.

Meanwhile, only two mothers who were housewives never gave plain water to their infants, thus meeting the criteria of exclusive breastfeeding until six months of their infants’ age.

ii) The relationship between giving plain water and exclusive breastfeeding
All the participants who gave plain water to their infants were satisfied with the practice. They believed that they had done their best by breastfeeding their infants. For them, mothers were not doing right if they gave infant formula, but the issue of mixing breastfeeding with plain water was not of a concern. It was partly due to inadequate knowledge on the definition of exclusive breastfeeding. Almost all of them did not know that infants only need breast milk as their nutritional source in the first six months of life. Some of them mentioned as below:

“Saya menyusu sepenuhnya tapi campur juga dengan air masak. Kalau susu tin, memang saya tak belilah (I fully breastfeeding my infants but I mix with plain water. I never buy infant formula)”, Y, teacher, FGD.

“Tanpa air masak tu kita tak pernah dengar. Dia [jururawat] hanya kata penyusuan susu ibu ekslusif tapi dia tak cakap ekslusif itu...
tidak termasuk air masak (We never heard about not giving plain water. She [nurse] only mentioned exclusive breastfeeding, but did not tell us that exclusive breastfeeding means not to add plain water)”, A, teacher, FGD.

In addition, there was a wide spread belief among the participants that different side of the breasts had different functions. They claimed that the right side of the breast contained food or rice and the left side was water. The belief had an important consequence on their practice. One group claimed that infants did not need additional water anymore because they already received it from the left side of the breast. However, in contrast to that, another group of participants felt that there was no harm to feed the infants with water since they were already exposed to the water from the left side of the breast.

iii) The advice to give water
Almost all the participants had received advices to give plain water to their infants in the first six months after delivery. The most commonly mentioned people who influenced the practice were their mothers, mother-in-laws, husbands, friends and other older people. It was expressed as below:

“Ibu kita ke, mak mertua ke, memang suruh bagi air masak (Our mother or mother-in-law will definitely ask us to give plain water)”, M, nurse, FGD.

“Kalau kita tinggal sendiri tidak mengapa. Kalau tinggal dengan mak mertua, anak menangis dia tanya tak beri air masak ke? Tak payah orang tuaal, suami saya pun, dia kata bagi-bagilah air masak tu (If we stay alone is okay. If we stay together with mother-in-law, if our baby cries she will ask why don’t you give plain water? Not just old people, my husband also forced me to give plain water)”, S, housewife, FGD.

“Adalah kawan-kawan, kalau anak dia kuning dia bagi air masak. Dia suruh kita bagi jugalah (My friends gave plain water if their babies had jaundice. They also ask me to do the same)”, Z, housewife, IDI.

iv) The reasons for giving plain water
A majority of the reasons given by the participants to add plain water were related to the infants. They almost always correlated crying with hunger. Whenever their infants cried, the participants believed that they were hungry. Thus, for them, their breast milk was not enough to satisfy their infants and need to be complemented with plain water. A clear example was as quoted:

“…macam anak menangis, bosannya dengar, tak cukup susu. Dia [mak mertua]suruh suap air masak (…like when the baby cries. It’s disturbing to hear, not enough milk. She [mother-in-law] asks me to feed with plain water)”, A, housewife, FGD.

In addition, like adults, they felt that the infants need plain water to prevent thirst. Even though they already fed with breast milk which is full of water, they still referred it as food. Thus, they supplemented with additional plain water. Water was also needed to wet the infant’s mouth, throat and tongue. Similarly, they used the plain water to wash away the left-over milk in the infant’s mouth. Another reason for using plain water was for the prevention of constipation. Below were the statements given by some of the participants:

“Nanti anak kita kering tekak sebab air susu tu pekat (The baby will be thirsty because the breast milk is concentrated)”, Z, housewife, FGD.
“Selepas menyusu dada, saya bilas tekak anak saya dengan air suam, takut dia ada sisa-sisa susu (after breastfeeding, I wash my baby’s throat with plain water. I am afraid there is some left-over milk)”, A, housewife, IDI.

Interestingly, some participants gave plain water very early in the infant’s life as a training method for the infant. They believed that the infants needed to be trained so that they will drink plain water when they grew up later. One of them said:

“Biasanya selepas susu dada, kita beri juga air masak sebab kita nak ajar dia. Nanti bila kita dah beri susu campur, dia manis, jadi kena tambah air masak. Kita ajar dari kecil lagi untuk minum air masak. Kalau tidak, bila besar susah baru nak ajar minum (I usually give plain water after breastfeeding because I want to train my baby. Later, when I mix with infant formula, it is sweet and I need to add with water. So, I teach him from now. If not, it is difficult if I only teach him to drink water when he already grows up)”, A, housewife, FGD.

Among other reasons, there were reasons related to the participants themselves. One of them was lack of knowledge. Many of them did not know that plain water was not needed in addition to breast milk in the first six months of life. One of them quoted as below:

“Sebelum ini memang saya tidak tahu bahawa tidak mengapa kalau tidak beri air masak (Before this, I never know that it is okay not to give plain water to the baby)”, A, teacher, FGD.

Discussion

Our study demonstrated that infants below six months of age were commonly given plain water. Even though some of them were not introduced with infant formula, they were given plain water in addition to breastfeeding. It was in accordance to the findings from the national study conducted by the Ministry of Health. Similar situation was reported in other studies elsewhere. In Turkey, one of the themes emerged from a focus group discussion was ‘water is essential for babies’, and they mentioned that everybody gives water to their infants.14

A qualitative study conducted in Mozambique also noted a widely held belief that infants need to drink water in the first six months of life.15 About 25% of Latino infants from a study in the USA were found to be supplemented with water or tea, with water being more commonly given than tea.16 However, in Lesotho, most infants were supplemented with water, sugar and/or salt compared to plain water.17

We also found that infants were given water in the very early age of life. Similarly, in Brazil, 5.9% and 58% of infants involved in a study were given plain water on the first day after hospital discharge, and at four months old, respectively.18 Almost one-third of mothers in Ghana gave water to their infants soon after delivery and within one month of life.19

The belief that every mother gave plain water to their infants, and that the practice was acceptable led to an important insight in breastfeeding promotion. The mothers and their infants were not able to receive the maximum benefits of exclusive breastfeeding, and at the same time, put their infants at a high risk of diseases related to early introduction of other food, especially water. These include impairment in the infant’s nutritional status, growth, development and survival through replacement of the nutrient-rich breast milk.
with water which have little or no nutritional value. In addition, supplementing with water also put the infants at risk of diarrhoeal diseases.20 The findings also pointed out an inadequacy in the existing breastfeeding education. All governmental health clinics and hospitals were following the National Breastfeeding Policy, and the Ministry of Health has revised the Malaysian Dietary Guidelines in 2010. The current recommendation is to encourage exclusive breastfeeding for six months, and all mothers should receive education on breastfeeding even during pregnancy. Since mothers involved in this study were those seeking antenatal follow-up at governmental health clinics, they should have adequate knowledge on breastfeeding. However, almost all of the mothers did not know that giving plain water was not recommended in the first six months of life.

Besides inadequate knowledge, this study also identified influential people who usually advised mothers to give water to their infants. Among all, their mothers, mother-in-laws and husbands were routinely mentioned by the respondents. These people were not commonly met at the health clinics, thus they were less exposed to the current information on breastfeeding. In contrast, the major sources of advice to give water among women involved in a study in Lesotho were the woman herself and the health care provider. During the study, the recommendation of exclusive breastfeeding for six months was still new, and many nurses were still not aware of it. However, the grandmothers claimed that they never gave water to their infants before and it was a new practice.17 Satisfaction of hunger, prevention of thirst, cleaning of infant’s mouth and prevention of constipation were the common reasons for giving water. The reasons were also given by other mothers to feed their infants with water.15-19 Surprisingly, nurses also gave a reason of preventing constipation for recommending water.17 Similarly, the respondents in this study had highlighted the issue that nurses also gave water to their infants, and it happened while in the postnatal ward. The above reasons were not scientifically based. As high as 88% of breast milk composed of water, and it exceeds the requirement of a normal infant, even during hot weather.20 Thus, water is not needed in the first six months of life.

It is clear that the issue of giving water needs to be addressed to improve exclusive breastfeeding practice. One important strategy is through improvement in breastfeeding education. The message of ‘do not give water’ needs to be communicated to all, with emphasis on why water is not required and the risk of adding it. However, water is ‘the gift of life’, and many people believe the importance of it. Therefore, a more harmonious message is needed, for example ‘give water to infants only after six months of age’.

The education should focus on the common reasons for giving water, and prove their insignificance. It should be in a form of a comprehensive communication strategy. Therefore, it should involve not only the mothers, but all influential people in their lives. Their mothers, mother-in-laws and husbands could be approached through an outreach program into the community, and not just a clinic-based strategy.

Acknowledgement

We would like to thank our institution and the Ministry of Health for approving the conduct of this study. A special appreciation
also goes to all staff of the three health clinics for their great cooperation, the moderator and all the respondents for providing us with the most valuable information.

References


ORIGINAL ARTICLE

WITHDRAWN: AN EVALUATION ON THE EFFECTIVENESS OF THE MCISAAC SCORING RULES IN THE MANAGEMENT OF CHILDREN DIAGNOSED WITH SORE THROAT IN PAEDIATRIC GENERAL WARD, HOSPITAL KULIM

S P Thillaivanam, B Ibrahim, S Gopalakrishnan

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PREVALENCE OF UNDERNUTRITION AMONG UNDERPRIVILEGED PRESCHOOL CHILDREN (2-6 YRS) OF MIDNAPORE TOWN, INDIA

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Abstract

Background: Malnutrition in preschool children is a major public health problem globally. It is more common in developing countries. It affects growth and development thus impairing both physical and mental ability. Methods: This community based, cross-sectional survey was carried out among 658 underprivileged children (315 boys) of 2-6 years from Midnapore, India. The nutritional status of the children, Composite Index of Anthropometric Failure (CIAF), and the index of their stunting, underweight and wasting were evaluated. The same parameters were calculated as Z-score using the suitable reference values. The One-way ANOVA analysis (F value), Student’s ‘t’ tests and Chi-square test were done to evaluate the association amongst individuals, group or set of data. Results: The overall prevalence of undernutrition was; underweight 43.77%, stunting 40.58% and wasting 23.40%. Severe underweight (Z score <-3), stunting and wasting was 12.61%, 16.72% and 5.32%, respectively. Prevalence of underweight, stunting and wasting was higher in boys (46.98%, 43.17%, and 25.40%) than girls (40.82%, 38.19% and 21.57% respectively). Altogether, the CIAF was 58.21%, and gender-wise boys, 61.3% and girls 55.39%. The indices of stunting, underweight and wasting of the studied population were 0.69, 0.75, and 0.40 respectively. Conclusion: The present study revealed a certain extent of prevalence of undernutrition among preschool children in the studied area. It is differentially manifested in boys and girls. Several actions have been initiated in this area by the Government at policy making and implementation level. Nutritional awareness and the up gradation of education in the population may improve the present scenario.

Keywords: Undernutrition, Preschool Children, Stunting, Wasting, CIAF

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Introduction

Global nutritional status is a major determinant of health and well-being among children which should be studied in relation to spatial as well as temporal dimension. Malnutrition continues to be a major public health problem throughout the developing world, particularly in South Asia and sub-Saharan Africa. It makes a child susceptible to infections especially sepsis, pneumonia and gastroenteritis. It results slower the recovery from infection and increased child mortality.

India has the highest incidence of childhood malnutrition in the world. A significant number of preschool children are moderate to severely malnourished. The 30% of newborn children are significantly underweight. A large number of Indian women are also found to be anemic. Over the last few decades, one of the greatest problems in India is malnutrition among five year-old children. Based on the report of National Nutrition Monitoring Bureau and National Institute of Nutrition (1993) nearly 43.8% children suffer from moderate degrees of protein energy malnutrition.

The Composite Index of Anthropometric Failure (CIAF) was proposed by Peter Svedberg (2000) as a new measure of undernutrition beside conventional indices i.e., stunting (low height-for-age), underweight (low weight-for-age) and wasting (low weight-for-height). Based on Svedberg’s model, Nandy et al. (2005) had utilized the CIAF on Indian data and recommended its use in preference to the three conventional measures of undernutrition i.e., stunting (ST), underweight (UW) and wasting (WS). However, a recent report has highlighted some shortcomings of CIAF. Although CIAF is a useful composite measure, it fails to highlight the individual contribution and importance of ST, UW and WS relative to the overall prevalence of undernutrition. To know the rates of ST, UW and WS relative to the overall prevalence of undernutrition, three new indices are required and these are Stunting Index (SI), Underweight Index (UI) and Wasting Index (WI). These new indices provide information on the relative significance and severity of these three measures with respect to the total prevalence of undernutrition. Our research provides, for the first time, evaluation on the level of undernutrition among preschool children (2 to 6 years) in Midnapore district in West Bengal using these new indices. The present outcome may be paralleled with the scenario of the analogous global populations from other developing countries. So, this outcome may increase the etiological predictability of nutritional impairment and the efficacy of global intervention procedure as well.

Methods

Study location and participants

The study is undertaken in the district town Midnapore and its surrounding areas of Paschim Medinipur District (22.25°N 87.65°E), West Bengal, India. Midnapore is 23 meters above the sea-level and 127 km away from Kolkata. In the 2011 census, Midnapore municipality had a population of 169,127, of which 85,362 are males. The 0–6 year’s population is 14,365.

The current research topic has been approved by the local institutional board of ethics within which the work is undertaken. Permission from the local municipality/school authority is collected.
Study design

The study is designed as a community based cross-sectional type which is conducted from August 2011 to October 2011. We visited the study area several times during the stipulated period. In our investigation, 658 preschool children (2 to 6 years, 315 boys) are chosen by systematic random sampling. The socioeconomic status of the children’s family is assessed by Kuppuswami’s socioeconomic status.16

The questionnaire is based on demographic information, anthropometric data and personal hygiene. The child is identified by name, age and sex. The date of birth is obtained from the birth certificates in order to ensure the quality of data. The anthropometric measurements including the height and weight of the children are measured using standard techniques. 17 The height and weight measurements are recorded to the nearest 0.1 cm and 0.5 kg respectively.

The nutritional status of the children is evaluated using age and sex specific values of height and weight from the National Centre for Health Statistics (NCHS) reference data.18 The indices of undernutrition such as stunting, underweight and wasting are calculated by Z-score using the reference values of height-for-age, weight-for-age and weight-for-height of NCHS standards, respectively. Z-scores are calculated following the standard formula:

\[ Z = \frac{X - \text{Median of NCHS}}{\text{Standard deviation of NCHS}}, \]

where \( X \) is an individual value. Three Z-scores are calculated: height-for-age Z-score (HAZ), weight-for-age Z-score (WAZ) and weight-for-height Z-score (WHZ). The following scheme is utilized to define undernutrition:

- Stunting: HAZ < –2
- Underweight: WAZ < –2
- Wasting: WHZ < –2

Children with Z-score below –2 of any of the indices are considered to be undernourished and the children with Z-score below –3 are considered to be severely undernourished.

Based on their nutritional status children are grouped in six categories (A to F) to evaluate the CIAF value following the Peter Svedberg’s (2000) model.10 These groups included children with height and weight appropriate for their age (i.e., Z-scores > –2) and are designated under the category of no “anthropometric failure”. And the rest children are designated as “anthropometric failure” of one or more forms. The CIAF evaluation are done excluding those children who are not in anthropometric failure group (A) and including those children who are wasted and/or stunted and/or underweight (groups B–F) (Table 3). It therefore provides a single measure with which overall prevalence of undernutrition may be estimated more precisely.11 This measure extended the model of Svedberg (2000) by identifying an additional subgroup of only underweight designated as Y.

The three new indices of childhood undernutrition are:

- Stunting Index (SI) = Stunting / CIAF
- Underweight Index (UI) = Underweight / CIAF
- Wasting Index (WI) = Wasting / CIAF

Statistical analysis

One-way ANOVA analysis (F value) was undertaken to test for age differences in
mean height and weight. Student’s ‘t’ tests were done in the present investigation. Chi-square tests were done to verify age association, difference between CIAF and ‘no failure’. Data processing and statistical analyses were done using the SPSS for Windows statistical software package (Version 10.0, SPSS Inc., Chicago, IL, USA, 2001). Descriptive statistics were used for all the variables studied. The p value of ≤0.05 was considered statistically significant.

**Results**

Figure 1 shows an age wise changes in stunting, wasting and underweight index (SI, WI and UI respectively) in boys and girls child. These data indicate an increasing tendency in UI and WI in boys.

**Figure 1. Age-wise changes in stunting, wasting and underweight index in the children**

![Graph](image1.png)

Figure 2 demonstrates the occurrence of CIAF, STN, UWT and WAS in different ages of children. These results illustrate a higher rate of CIAF in boys of all ages.

**Figure 2. The occurrence of Composite index of anthropometric failure (CIAF), stunting (STN), underweight (UWT) and wasting (WAS) in different ages of children**

![Graph](image2.png)

Figure 3 demonstrate the similar type of occurrence of STN, WAS and UWT alone or in combination at different ages of either gender. Anthropometric failure in terms of...
composite value is shown to be differentially manifested in girls and boys.

The age and sex related distribution of mean weight and height of the participants are presented in Table 1. A total of 658 children (315 boys) are included in this study. There is no significant gender difference of weight and height in the studied group except in the age of 4 years when boys are significantly (P<0.05) heavier and taller than the girls. Significant (P<0.0001) age differences are noticed in their mean weight (boys- weight: F = 42.54; height: F = 99.98) and (girls-weight: F = 54.42; height: F = 112.87).

Table 2 presents the rates of stunting, wasting and underweight among the studied populations. Moderate (Z score between –2 to –3) or severe (Z score <3) underweight is found to be higher in boys than girls (33.65% vs. 28.86% & 13.33% vs. 11.90%, respectively). Prevalence of moderate stunting (Z score between –2 to –3) is higher in boys than girls (26.67% vs. 21.28%). The prevalence of severe wasting (Z score <3) is found to be predominant in boys (6.98% vs. 3.79). According to the reference criteria (Z score below –2) recommended by WHO, 43.77%, 40.58%, 23.40% children are found to be underweight, stunted and wasted respectively. Severe (Z score below –3) underweight, stunting and wasting are found in 12.61%, 16.72% and 5.32% of the children respectively.

Discussions

The undernutrition is increasingly recognized as a prevalent and important health problem in many developing countries including India. This problem has...
serious and long term consequences for the child and as a whole the development of a nation. The scenario of undernutrition in India is also similar to other developing nations with analogous socioeconomic and demographic profile i.e. South American, African, South East Asian countries and China. So the present study has an immense importance in terms of the global perspective. In the relation to nutritional assessment, several anthropometric indices and other advanced parameters like thinness, stunting, wasting, Z-score, CIAF values could serve well for evaluating community health status. A recent report on underweight and stunting among children of certain location of Midnapore, India provides the information of malnutrition in this region.

Table 1. Mean±SD of weight and height in the study population

<table>
<thead>
<tr>
<th>Age group (years)</th>
<th>Boys</th>
<th>Girls</th>
<th>Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Weight (Kg)</td>
<td>Height (cm)</td>
</tr>
<tr>
<td>2</td>
<td>46</td>
<td>10.85±1.57</td>
<td>82.30±5.86</td>
</tr>
<tr>
<td>3</td>
<td>52</td>
<td>11.86±1.62</td>
<td>91.13±7.01</td>
</tr>
<tr>
<td>4</td>
<td>91</td>
<td>13.39±2.59</td>
<td>96.29±7.84*</td>
</tr>
<tr>
<td>5</td>
<td>82</td>
<td>14.19±2.46</td>
<td>101.21±6.72</td>
</tr>
<tr>
<td>6</td>
<td>44</td>
<td>16.94±3.50*</td>
<td>109.24±7.84*</td>
</tr>
<tr>
<td>Overall</td>
<td>315</td>
<td>13.47±3.04</td>
<td>96.49±10.57</td>
</tr>
<tr>
<td>F value</td>
<td>42.540**</td>
<td>99.983**</td>
<td>54.421**</td>
</tr>
</tbody>
</table>

**P<0.0001, *P<0.05 significant sex and age differences. F represents ANOVA.

Based on the WHO classification of severity of malnutrition, the results of the present study (Table 3) clearly indicate that, the overall (age and gender combined) prevalence of underweight (43.77%), stunting (40.58%) and wasting (23.40%) are found to be very high. When these results are compared with the results from different states of India, it is found that the prevalence of underweight and wasting in our study is higher than the national prevalence. In this relation some report from different countries can be paralleled with our present findings.

Table 2. Distribution of studied children aged 2-6 years according to z score

<table>
<thead>
<tr>
<th>Z score</th>
<th>Underweight</th>
<th>Stunting</th>
<th>Wasting</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Boys</td>
<td>Girls</td>
<td>Sex Combined</td>
</tr>
<tr>
<td>&lt;-3</td>
<td>42</td>
<td>41</td>
<td>83</td>
</tr>
<tr>
<td></td>
<td>(13.33)</td>
<td>(11.9)</td>
<td>(12.61)</td>
</tr>
<tr>
<td>-2 to -3</td>
<td>106</td>
<td>99</td>
<td>205</td>
</tr>
<tr>
<td></td>
<td>(33.65)</td>
<td>(28.86)</td>
<td>(31.16)</td>
</tr>
<tr>
<td>Moderate to Severe</td>
<td>148</td>
<td>140</td>
<td>288</td>
</tr>
<tr>
<td>(&lt;-2)</td>
<td>(46.98)</td>
<td>(40.82)</td>
<td>(43.77)</td>
</tr>
<tr>
<td>-1 to -2</td>
<td>100</td>
<td>120</td>
<td>220</td>
</tr>
</tbody>
</table>

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In terms of gender, the prevalence of wasting among girls was 21.57% and among boys was 25.40%. The rates of underweight in boys are higher (46.98%) than girls (40.82%). Similarly, stunting in boys are higher (43.17%) than girls (38.19%). It can be summarized that both boys and girls are differentially affected with undernutrition.

In search for the causative factors of different stressful conditions, the socioeconomic profile, distribution of health beneficiaries, household environment and health awareness are proposed to be significantly important. One report suggests that the qualitative and quantitative status of meals in family/ household may be useful for studying family mealtime environments and children's eating behaviors which is also a helpful predictor of health status.25

Our study shows a similar prevalence (58.21%) of overall undernutrition (as indicated by CIAF) in a recent study (59.8%) done by Nandy et al (2005) which is in line with the report of National Family Health Survey (NFHS-2, 1998-99).11,26

Report reveals that children less than 5 years of age residing in the slum areas of Coimbatore, Tamil Nadu, India showed a higher prevalence of undernutrition (CIAF, 68.6%).13 Similar prevalence of undernutrition is noticed in the pre-school children of Chapra, Nadia District, West Bengal, India.27 In a global comparison, the present CIAF is higher than Nepal (56.5%), Tanzania (45.9%), Zimbabwe (35.8%), Bolivia (26.6%) and Peru (23.8%) (Nandy and Miranda, 2008). In relation to the precautionary measure against child undernutrition, a community-based supplementary feeding has been recommended for promoting the growth of children under five years.28 In this regard, however, it can be noted that the government scheme of serving mid-day meal to school going children have been very popular. Not only it upgrades the child health but also attract the children to increase the school attendance. More attendance result more serving coverage and lowering the undernutrition. The improvement of the health facilities, incorporation of Integrated Child Development Scheme (ICDS) projects, antenatal care centre for the underprivileged group showed up gradation of the nutritional status of the preschool children. The program coverage needs to be increased to include more number of children. Beside materialistic support, more easygoing health education will increase the spontaneous participation of the children’s family.

Table 3. Subgroups of anthropometric failure among the study population

<table>
<thead>
<tr>
<th>Group</th>
<th>Boys</th>
<th>Girls</th>
<th>Sex combined</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>A</td>
<td>(No failure)</td>
<td>122</td>
<td>38.73</td>
</tr>
</tbody>
</table>
In addition, it is suggested that precaution should be taken at the maternal level also. Among pregnant women in poor communities in Bangladesh, treatment with multiple micronutrients, including iron and folic acid combined with early food supplementation resulted in decreased childhood undernutrition and mortality.\(^{29}\) The stunting and underweight index in our present study is very high (0.697 and 0.752 respectively) which indicate that the population is in chronic undernutrition necessitating increased long term nutritional intervention. Extreme levels of underweight and stunting among pre-adolescent children of low socioeconomic class have been reported from Madhyamgram and Barasat, which are the semi-urban places in West Bengal, India.\(^{30}\) These places are not far away from the present study place. Protein energy malnutrition is found among the undernourished children when compared with the normal children. It may be the important cause of undernutrition noticed in our study. Beside this, socioeconomic status, hygienic condition, sanitation, life style and education play key role resulting malnutrition. Infection, adverse cultural practices of child care, breast feeding, weaning and some superstitious factors also influence certain community. The studied population was randomly selected from the marginalized or underprivileged community. Our earlier finding in similar type of population suggests that some time, the children do not complete their immunization course due to their parents’ ignorance and lack of health awareness. In addition, the children experience a lower hygienic status, adverse household practice, infectious diseases and malnutrition.\(^{31,32}\) Comprehensive child survival programme, supplementary feeding, health education and awareness may be the way out from undernutrition in this community.

Table 4. Values of SI, UI and WI among the studied children

<table>
<thead>
<tr>
<th>Index</th>
<th>Boys CIAF = 193</th>
<th>Girls CIAF = 190</th>
<th>Overall (sex combined)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SI = Stunting / CIAF</td>
<td>136 / 193 = 0.705</td>
<td>131 / 190 = 0.689</td>
<td>267 / 383 = 0.697</td>
</tr>
<tr>
<td>UI = Underweight / CIAF</td>
<td>148 / 193 = 0.767</td>
<td>140 / 190 = 0.737</td>
<td>288 / 383 = 0.752</td>
</tr>
<tr>
<td>WI = Wasting / CIAF</td>
<td>80 / 193 = 0.415</td>
<td>74 / 190 = 0.389</td>
<td>154 / 383 = 0.402</td>
</tr>
</tbody>
</table>

Few interesting findings show that improving agricultural capabilities can have a positive impact on childhood nutritional outcomes. Interventions at grass-root level to improve education, health, sanitation and household infrastructure, care and feeding practices are also critically prerequisite. Innovative strategies that integrate
agriculture and nutrition programs stand a better chance of combating the malnutrition problem. India is an agriculture based country. But more innovation in field-productivity of drought-, flood- and other environmental ailment-resistant variety of grains should be introduced with the help of modern biotechnological research. Selective and cautious choice of land for industrial utilization and secured agricultural land bank and agricultural activities will help the sustenance of good social structure and proper community health. One report suggest that the overall nutritional status of children under 5 yr and relevant other social indicators was comparatively stable during and after the global economic crisis, attributable to the Chinese government's policy response. Likewise, being agriculture based country; India also experienced a similar scenario of overall protection. But the nutritional status in poorer rural areas fluctuated in response to the economic crisis. So, intervention must be taken to protect the most vulnerable population.

In the present study we have covered only a limited population of the community. We think further detailed research work will reveal the clear picture. Socioeconomic upgradation in the developing countries necessitates the continuous monitoring of nutritional factors and verify/ validate the developmental indicators in preschool children. In this regard, the policy of China and several countries may be mentioned. Our present estimates will be helpful for the nation to formulate surveys which assess the prevalence of factors that contribute to undernutrition. Some recent actions have been taken in the present studied area at Government and local administration level to upgrade the nutritional/ health status of the local community and restore the equity in the distribution of benefits. Detail longitudinal investigations are required to conclude the possible association of different factors. The understanding of how several factors attributing to malnutrition, vary by geography, socio-demographic and economic profiles will make it easier to design global interventions that are more integrative and effective.

References


Prevalence of Undernutrition Among Underprivileged Preschool Children (2-6 Yrs) of Midnapore Town, India


Prevalence of Undernutrition Among Underprivileged Preschool Children (2-6 Yrs) of Midnapore Town, India


CASE REPORT

A CASE OF MISSED TUBERCULAR LYMHPADENITIS
COMPLICATING AS SCROFULDERMA
AND ABSCESS FORMATION

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Tabassum Nawab, Minakshi Sardha

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Abstract

There has been a rise in the incidence of tuberculosis in recent years. This increase appears to be due to several factors including development of resistance to the most commonly-used chemotherapeutic substances, human immunodeficiency virus (HIV) infection, and increased travel and migration. Most of the cases are treated by early diagnosis and use of very effective drugs but problem arises when either there is difficulty in diagnosis or the case is complicated by presence of immunodeficiency, multidrug resistance or non compliance to treatment. We present a case of 5 year old male child who presented tubercular lumpadenitis as scrofulderma and abscess formation.

Keywords: Tubercular Lumpadenitis, Scrofulderma, Abscess

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Email: arshadanjum@yahoo.com

Introduction

There has been a rise in the incidence of tuberculosis in recent years. This increase appears to be due to several factors including development of resistance to commonly-used chemotherapeutic substances, concomitant human immunodeficiency virus (HIV) infection, and increased travel and migration.

Most of the cases can be treated by early diagnosis and use of effective drugs but problem arises when either there is difficulty in diagnosis or the case is complicated by presence of immunodeficiency, multidrug resistance or non compliance to treatment.

In our country compliance to seek treatment as well as to take drugs regularly is still a major problem. We present a case report where a simple case of tubercular lymph adenitis (which otherwise would have been treated very easily) got complicated because of missed diagnosis and ignorance on the part of patient’s attendant to seek early treatment.

Cutaneous tuberculosis remains a rare infection, with an incidence of 3.5% reported among patients with organ tuberculosis. Scrofuloderma is one of the commonest forms of cutaneous tuberculosis reported in some series, most cases resulted from an infected lymph gland, and less
A Case of Missed Tubercular Lymphadenitis Complicating as Scrofuloderma and Abscess Formation

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commonly as a result of an infected joint or bone. There have also been reports of scrofuloderma following surgical drainage of the joint and infection of the lacrimal system.3,4

Case Report

A five year old male child developed multiple swellings over the right side of the neck which progressively increased over a period of 8 months (Figure 1).

Figure 1. Patient with multiple swellings over right side of the neck

There was no h/o fever or any other constitutional symptoms. These swellings ruptured spontaneously giving rise to multiple discharging sinuses. The surrounding skin developed multiple papule like eruptions and another swelling appeared over the sternal area over the last 20 days which also increased in size and became red and tender. Child was unvaccinated for BCG but there was no H/o contact with an open case of Tuberculosis.

O/E: multiple discharging sinuses were present over the right cervical region with a abscess below the suprasternal region. Montoux test was strongly positive (22mm×22mm), chest x-ray was normal and complete blood count was also normal.
FNAC smear showed acid fast bacilli on Z-N staining and chronic granulomatous lesion was seen on histopathology. AFB culture was positive after 8 weeks of incubation. The child was managed on lines of tubercular lymphadenitis and antitubercular therapy was started. Antibiotics were also started to treat the secondary infection. The child responded to the treatment.

Discussion

Cervical lymphadenopathy is the most common head and neck manifestation of TB and can occur in any age group. The incidence of cervical lymphadenitis has increased in parallel with the increase in the incidence of mycobacterial infection worldwide. As seen in this case, concomitant infection with aerobes or anaerobes frequently occur, preventing the early diagnosis of tuberculosis if not suspected. Presence of purulent discharge or features suggestive of a carbuncle can cause further confusion and misdiagnosis as a bacterial abscess. Cutaneous tuberculosis is frequently elusive as it mimics a wide differential diagnosis and also evades microbiological confirmation despite recent advances in sophisticated techniques. So high index of suspicion should always be there in order to make an early diagnosis and prevent complications.

References


CASE REPORT

MASSIVE EPISTAXIS IN A NEONATE: A SYMPTOM OF VEIN OF GALEN MALFORMATION!

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2. Pediatric Surgery, Aligarh Muslim University, Aligarh, India
3. PGI Chandigarh, India

Abstract

Vein of Galen Malformation is a rare and intriguing congenital cerebro-vascular anomaly having varied presentation. We present a case of a neonate who presented with one episode of massive epistaxis and was eventually found to have Vein of Galen Malformation with associated complex and unique vascular malformations including AMVs, Carotico-cavernous fistula and Duplicate MCA artery.

Keywords: Epistaxis, Vein of Galen Malformation, Neonate

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Introduction

The congenital malformations of Vein of Galen affect the cerebral vasculature leading to complex anatomy of the vein. The presentation is wide-ranging. Imaging involves technical know-how on the part of the radiologist and the management is difficult.

Case Report

A 24-day-old female baby presented in emergency with massive epistaxis, which was eventually controlled by compression and medical management. There was history of enlargement of head birth. However, there was no history of seizures. On physical examination, the head size was increased with prominent superficial veins on face and neck and pulsating proptosis of left eye. Based on the signs and symptoms of the patient some intracranial vascular mass lesion was suspected. We examined the baby with USG skull and color Doppler. USG showed noncommunicating hydrocephalus with massively dilated bilateral lateral and third ventricle. Color Doppler Imaging showed a large rounded anechoic structure of size about 5x3.5cm posterior to the third ventricle showing turbulent flow draining posteriorly into the dilated straight sinus. Based on the Doppler findings the preliminary diagnosis of Vein of Galen malformation was made and MRI was advised. MRI study of the brain revealed a well-defined supratentorial midline cystic mass lesion of approximate size 5.2x3.7cm posterior to the third ventricle showing signal void on spin echo sequences (FIGURE 1).
Figure 1. T2 weighted spin echo MR image showing supratentorial midline cystic mass lesion showing signal void on SE sequences and communicating with the dilated straight sinus

The lesion was communicating with the dilated straight sinus. On contrast study, there was strong and homogenous enhancement of the central patent lumen with peripheral mural thrombus. Multiple intracranial vascular malformations in form of arterio-venous malformations and arterio-venous fistulas were seen. AVMs with nidus were seen in bilateral lateral and anterior aspect of the Vein of Galen malformation. Duplicate left MCA artery was seen arising from cavernous part of the ICA and draining into saggital straight sinus with dilated left sided superior ophthalmic vein suggestive of carotico-cavernous fistula, most probably the cause of pulsating proptosis in the patient. Dilated anomalous and tortuous vessels were noted on the anterior surface of the brain stem extending into the cervical spinal cord (FIGURE 2).

Figure 2. Dilated anomalous and tortuous vessels on the anterior surface of the brain stem and cervical spinal cord
Figure 3. MR angiography showing VOGM and numerous associated intracranial vascular malformations

Based on MRI and MR angiography (FIGURE 3) the diagnosis of Vein of Galen Malformation (VOGM) with multiple arteriovenous fistula and malformation was made and the patient was advised endovascular embolisation.

Discussion

Vein of Galen malformation (VOGM) is a rare intracerebral vascular malformation, which accounts for approximately 1% of all intracranial vascular malformations but is responsible for a much larger percentage of cases in pediatric age group. The malformations involve the deep midline venous channels and has been proved to be the dilated embryonic median prosencephalic vein of Markowski instead of the vein of Galen itself. The VOGM occurs due to direct arteriovenous connections between the arterial network and the median prosencephalic vein. The main feeders of the malformation are the anterior cerebral, middle cerebral, choroidal, thalamoperforating and superior cerebellar arteries. Due to the high blood flow across the fistula the fetal pattern of venous drainage may persist, such as persistent falcine sinus. Yasargil classified VOGM into four types:

Type 1 is a small cisternal fistula between the VOGM and the pericallosal arteries or posterior cerebral artery.

Type 2 has multiple fistulous communications between the VOGM and the thalamoperforating vessels.

Type 3 has characteristics of both type 1 and type 2.

Type 4 is parenchymal AVM with drainage into the VOGM.
Lasjaunias et al classified VOGM into two types—choroidal and mural types Berenstein et al (1992).¹ The choroidal type is characterized by multiple fistulous communications between the anterior end of the median prosencephalic vein and choroidal, subfornicial or pericallosal arteries or subependymal branches of thalamoperforators. In mural type, the fistula is situated in the wall of the median prosencephalic vein and fed by collicular and posterior choroidal arteries. VOGM mainly manifests with cardiac or neurologic disturbances. The shunting of blood through the fistula results in high output cardiac failure and right to left shunting of blood causes cyanosis. If fistula remains untreated, pulmonary hypertension and even myocardial ischemia may ensue. The neurological manifestations are due to high cerebral venous pressure which is transmitted to the medullary veins preventing the resorption of fluid and thus results in hydrocephalus, cerebral edema and hypoxia. Thus hydrocephalus is secondary to impaired resorption of CSF due to venous hypertension and not due to Aqueductal compression.² The chronic hypoxia results in parenchymal injury resulting in cognitive impairment – delayed milestones to mental retardation.¹ The excessive intravenous pressure leads to opening of alternative channels for drainage of blood like facial veins or basilar or pterygoid plexus. These collaterals produce prominent facial veins and also may cause epistaxis, as in our case.¹

Neonates usually present with CHF and cyanosis. Infants and children usually present with macrocephaly or delayed milestones or failure to thrive.¹ Older children present with headache and seizures or some present with developmental delay, focal neurological deficits, proptosis and epistaxis. SAH or intracranial hemorrhage may occur due to rerouting of blood into the pial veins.¹ Most cases of VOGMs are detected on routine prenatal USG. Calcification can be seen in approximately 50% cases of thrombosed VOGM on plane radiograph; however calcification is seen only in 14% cases without thrombosis.⁵ Sonography and color doppler shows a cystic mass lesion posterior to 3rd ventricle at supracerebellar location with pulsatile blood flow within it and surrounding dilated feeding arteries. Sonography may also show hydrocephalus. USG is also very helpful in antenatal diagnosis and follow-up of patients for assessment of residual flow after endovascular therapy.

Contrast enhanced CT can show an intensely enhancing rounded lesion or ‘Target sign’ in a thrombosed VOGM with associated non communicating hydrocephalus and periventricular ooze.⁵ Occasionally focal infarcts, diffuse cerebral atrophy and parenchymal calcification may also be seen.¹ Spontaneous VOGM thrombosis has been described in many cases.⁴ Multislice CT angiography is very useful for detailed evaluation of the malformation and complete scan can be performed in a very short time compared to other modalities.

MRI is the investigation of choice for VOGM. It is used both in prenatal and postnatal periods. It can differentiate an AVM that drains into the prominent vein of Galen from true VOGM. It clearly depicts the vascular malformation apart from a detailed evaluation of cerebral parenchymal damage because of its superior soft tissue contrast. This is important for treatment planning and prognosis. MR angiography is used commonly for delineating the feeding vessels and venous drainage.⁶ Angiography however is the gold standard investigation for VOGM evaluation prior to any endovascular intervention. It depicts even small feeders supplying the aneurysm, as
well as the dynamic aspect of the venous drainage.\(^6\)

To conclude VOGM has a very poor prognosis if not treated early. Early diagnosis coupled with endovascular embolisation of the fistula and multidisciplinary management is however capable of significantly improving the dismal prognosis of such patients.

References


