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List of abbreviation

ALT	Alanine aminotransferase
ARF	Acute Rheumatic fever
ASA	Acetyl salicylic acid
AS	Aortic stenosis
AST	Aspartate aminotransferase
CHF	Congestive Heart Failure
CRF	Chronic Rheumatic Fever
GABHS	Group A beta-hemolytic streptococcal
GOD-PAP	Glucose Oxidase/Peroxidase-4-Aminophenazone-Phenol
INR	International Normalized Ratio
MRI	Magnetic Resonance Imaging
MS	Mitral stenosis
NSAID	Non-steroidal anti-inflammatory drug
PDA	Patant Ductus Arteriolsis
PE	Pericardial Effusion
PPS	Post Pericardiotomy Syndrome
PT	Prothrombin Time
PTT	Partial Thromboplastin Time
RF	Rheumatic Fever
RHD	Rheumatic Heart Disease

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Post pericardiotomy syndrome is a troublesome complication that can be often prolonged hospital stay period and disabling for patients. Different studies were conducted in order to understand the mechanisms that activate the inflammatory syndrome and guiding towards an optimal method of treatment and prevention ***(Shabetai, 2006).***

Based on the efficacy of indomethacin as anti-inflammatory drug in arthritis and gout ***(Wallance, 1997),*** Ankylosing Spondylitis ***(Eon Labs, 2000),*** pericarditis ***(Ryan et al., 1999)*** and the presumed mechanism of PPS, it is proposed that prophylactic treatment with an anti-inflammatory agent such as indomethacin may prevent PPS.

The present study aimed to:

1. Determine the prophylactic effect of indomethacin as a non steroidal anti-inflammatory drug for the prevention of the post pericardiotomy syndrome.

2. Shorten the patient stay in the hospital and improve the patient health quality through preventing occurrence of PPS and following up for patients' postoperative side effects.

Post pericardiotomy syndrome (PPS) is a common complication of cardiac surgery occurring a few days to several weeks after a cardiac operation in 10-40% of patients ***(Prince et al., 1997).***

PPS is a troublesome complication that can be often prolonged and disabling, and is characterized by postoperative fever, pericarditis and laboratory findings that confirm inflammation. Different studies were conducted in order to determine the etiology of PPS. Understanding the mechanisms that activate the inflammatory syndrome will contribute to the understanding of similar inflammatory processes and will guide towards an optimal method of treatment ***(Shabetai et al., 2006)***.

Treatment includes asprin, non-steroidal anti-inflammatory drugs (NSAIDs), and/or corticosteroids ***(Wessman et al., 2006)*** Corticosteroids are usually limited to those patients with contraindications, or who are intolerant or unresponsive to NSAIDs. Data suggested that colchicine may be useful in the treatment of patients with PPS ***(Molad, 2002 and Lange et al., 2001)***.

The optimal method for prevention of PPS in patients after cardiac surgery is not established. Several measures have been reported, such as administration of aspirin, colchicine, and steroids ***(Peter et al., 2009 and Finkelstein et al., 2002),*** all with limited success.

Indomethacin, firstly approved by the FDA in January 1965, is a non-steroidal anti-inflammatory drug, belongs to acetic acid derivative group. It is similar to ibuprofen and naproxen ***(Richard et al., 2006).*** Indomethacin is a very potent anti-inflammatory drug used for treating painful conditions, works by

reducing the production of prostaglandins. As a result, fever, pain and inflammation are reduced ***(Wallace, 1997).***

In this study, indomethacin was used as an anti-inflammatory drug which prevents the inflammation process by inhibiting formation of prostaglandin to prevent the occurrence of post pericardiotomy syndrome which is characterized by a febrile illness with an inflammatory reaction that typically involves the pleura and pericardium after open heart surgery ***(Herrera-Franco, 1999).***

Clinical Pharmacy

During the past few decades, clinical pharmacy services have developed around the world ***(DeRijdt et al., 2008).*** One of the major outputs of a clinical pharmacy service is the generation of interventions directed at preventing or reducing drug related harm and enhancing the efficacy of drug treatment ***(*Alderman *et al., 2001)*.**

Clinical pharmacy services have been broadly defined as the aspects of pharmacy practice directed at optimizing patient outcomes ***(The Society of Hospital Pharmacists of Australia, 1996).***

While there is no consensus on the definition of "clinical pharmacy," all proposed definitions refer to the contribution that pharmacists can make to the realization of high-quality and rational drug therapy ***(American College of Clinical Pharmacy, 2007).***

In a hospital setting, clinical pharmacy can be defined as the contribution of hospital pharmacists and their assistants to drug therapy as a part of the total care given to patients, in cooperation with physicians and nursing staff, with the goal to optimize the efficiency, effectiveness, and safety of drug therapy ***(DeRijdt et al., 2008).*** Clinical pharmacy interventions in inpatient medical care contribute to improved patient outcomes ***(Kaboli et al., 2006).***

Role of clinical pharmacist:

Much of the work undertaken by pharmacists in hospitals is traditionally regarded as clinical pharmacy activities. These activities include systemic interventions such as drug utilization review, education

programs and provision of drug information. In addition, clinical pharmacists also perform a range of functions directed at protecting individual patients from drug-related harm. Examples of these activities include medication order review, monitoring for adverse drug reactions and interactions, and the provision of patient medication counseling. These individually focused activities are undertaken in the interests of the patient, but also offer the opportunity to gather information about the circumstances in which the health and well-being of patients has been put at risk as a result of the potential for drug-related harm ***(*Alderman *et al., 2001)*.**

In cardiothoracic unit:

Having clinical pharmacist during physician rounds will decrease preventable adverse drug events especially in intensive care unit. A list of safe and cost-effective medications must be identified. Most of interventions made by clinical pharmacist are through adjustment of dose or frequency coming first and laboratory monitoring. Addressing medical errors is one strategy to improve safety of medication ***(Kucukarslan et al., 2003)*** Requirements for clinical pharmacist for promotion includes interpretation of laboratory values and pharmacokinetics ***(American College of Clinical Pharmacy 2007).***

The contribution of clinical pharmacy services is difficult to be measured but for sure it is beneficial since it covers prescription monitoring, reduction in length of hospital stays and incidence of adverse drug reactions and in total cost ***(Bowden et al., 2001)***.

Rheumatic heart disease

Background:

Rheumatic fever (RF) is a systemic illness that may occur following group A beta hemolytic streptococcal (GABHS) pharyngitis in children. RF and its most serious complication, rheumatic heart disease (RHD), are believed to result from an autoimmune response; however, the exact pathogenesis remains unclear ***(Chin and Li., 2010).***

RHD is an important problem in developing countries; however, many cases are detected only when the disease has progressed to cardiac failure. Screening can detect cases earlier, but there are no screening guidelines ***(Carapetis et al., 2008).***

RHD generally affects children, adolescents and young adults and is usually the result of cumulative cardiac valve damage from repeated or persistent episodes of acute rheumatic fever (ARF), which are sometimes asymptomatic ***(Bisno* et al.*, 2001).***

Frequency:

RHD is estimated to affect 15.6–19.6 million people worldwide and causes 233,000–492,000 deaths each year, 95% of which occur in developing countries ***(Carapetis et al., 2005).***

RF and RHD have not decreased in developing countries. Retrospective studies in developing countries demonstrate the highest figures for cardiac involvement and the highest recurrence rates of RF ***(Chin and Li., 2010).***

The quality of data on which these calculations are based, however, has often been poor. The degree of disease burden associated with RHD will remain uncertain until better, population-based data from a representative sample of developing countries in different regions are available ***(Carapetis et al., 2008).*** Annually, there are 400,000 deaths and hundred of thousands of children died due to RF and RHD ***(WHO, 1999).***

The prevalence of heart diseases in children in Egypt is not precisely estimated. Moreover, the incidence of RF is not expected to dramatically decline in the near future ***(Arafa et al., 2001).***

Mortality/Morbidity

RHD is the major causes of morbidity from RF. Variables that correlate with severity of valve disease include the number of previous attacks of rheumatic fever, the length of time between the onset of disease and start of therapy, and sex (the prognosis for females is worse than for males). Insufficiency from acute rheumatic valve disease resolves in 70-80% of patients if they adhere to antibiotic prophylaxis ***(Chin and Li., 2010).***

Pathophysiology:

RF is a systemic disease affecting the peri-arteriolar connective tissue and can occur after an untreated Group A Beta hemolytic streptococcal pharyngeal infection as shown in **figure (1)**.

RF develops in children and adolescents following pharyngitis with GABHS (ie, *Streptococcus pyogenes*). The organisms attach to the epithelial cells of the upper respiratory tract and produce a battery of enzymes, which allows them to damage and invade human tissues ***(Chin***

and Li., 2010). It is believed to be caused by antibody cross-reactivity. This cross-reactivity is a Type II hypersensitivity reaction ***(Abbas and Lechtman, 2006).***

Usually, self reactive B cells remain anergic in the periphery without T cell co-stimulation. During a Streptococcus infection activated antigen presenting cells such as macrophages present the bacterial antigen to helper T cells. Helper T cells subsequently activate B cells and induce the production of antibodies against the cell wall of Streptococcus. However the antibodies may also react against the myocardium and joints, producing the symptoms of RF ***(Abbas and Lechtman, 2006).***

After an incubation period of 2-4 days, the invading organisms elicit an acute inflammatory response, with 3-5 days of sore throat, fever, malaise, headache, and elevated leukocyte count. In a small percent of patients, infection leads to RF several weeks after the sore throat has resolved. Only infections of the pharynx initiate or reactivate RF ***(Chin and Li., 2010).***

Severe valve insufficiency during the acute phase may result in congestive heart failure (CHF), and even death (1% of patients). Whether myocardial dysfunction during acute RF is related primarily to myocarditis or is secondary to CHF from severe valve insufficiency is not known ***(Chin and Li., 2010).***

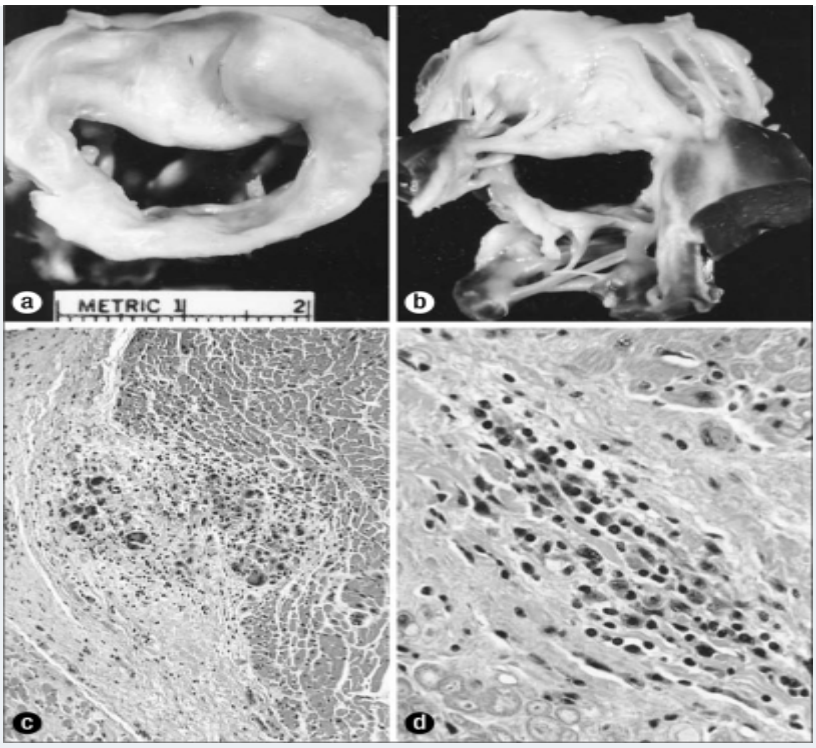

Figure (1): **Acute rheumatic fever and mitral stenosis.**

Excised valves viewed from **(a)** the left atrium and **(b)** the left ventricle and **(c, d)** Aschoff bodies, which were numerous in both excised left ventricular papillary muscles. Hematoxylin and eosin stain, ×110 **(c)**, ×400 **(d)**. ***(Roberts and Mi Ko., 2008).***

Clinical features and Diagnosis:

The disease presents suddenly, with fever, joint pain, malaise and loss of appetite ***(kumer and clark, 2002).***

Diagnosis relies on the presence of two or more major criteria or one major criterion plus two or more minor criteria. These are known as the Duckett Jones criteria.

On April 8 and 9, 2000, the members of the Committee on RF, Endocarditis, and Kawasaki Disease of the American Heart Association met with a group of international experts on RF, RHD, and streptococcal

infections to review guidelines for the diagnosis of ARF using the Jones criteria, including the 1992 statement on the "Jones Criteria Updated" ***(Ferrieri, 2002).***

The Duckett Jones criteria: ***(Jones Criteria., 1992)***

Major criteria:

1. Carditis.
2. Polyarthritis.
3. Chorea.
4. Erythema marginatum.
5. Subcutaneous nodules.

Minor Criteria:

1. Fever.
2. Arthralgia.
3. Previous RF or RHD.
4. Acute phase reactants: Leukocytosis, elevated eritrosedimentation rate (ESR) and C-reactive protein (CRP).
5. Prolonged P-R interval on electrocardiogram (ECG).