

Renal effects of prolonged use of furosemide in pediatric cardiac patients

Thesis

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All words could not express my love to my *father* and my *mother* for their continuous help and self-denial.

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To my sweet *kids*.

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List of abbreviations

• Alk. Ph.	Alkaline phosphatase
• ASD	Atrial septal defect
• BUN	Blood urea nitrogen
• Ca	Calcium
• Ca/Cr.	Calcium/Creatinine ratio
• Cr.	Creatinine
• HF	Heart failure
• K	Potassium
• Na	Sodium
• NC	Nephrocalcinosis
• Ph.	Phosphor
• PDA	Patent ductus arteriosus
• Ps	Pulmonary stenosis
• VSD	Ventricular septal defect

Abstract

Abstract

Congenital heart disease in children is usually associated with congestive heart failure (CHF). The most effective medical treatment of CHF is diuretics. Prolonged use of furosemide is associated with hypercalciuria, nephrocalcinosis and renal calculi.

This study included thirty patients with CHD receiving furosemide for more than 6 months. Thirty age and sex matched normal children were included as control group. The two studied groups were subjected to full history taking, general and local cardiac examination, laboratory investigations (CBC, serum Na, K, Ca, Ph, alkaline phosphatase, BUN, creatinine and calcium/creatinine ratio) and renal ultrasonography.

Nephrocalcinosis was detected in 5 (16.7%) patients. Urinary calcium/creatinine ratio was higher than normal in one case only. In conclusion, prolonged furosemide therapy could induce nephrocalcinosis.

Renal ultrasonography is a useful and non invasive method for nephrocalcinosis detection. Periodic renal ultrasonography is recommended for patients with prolonged furosemide therapy.

Keyword:

Heart failure, furosemide, nephrocalcinosis. abstract& introduction

Introduction

Introduction

Heart failure is a complex syndrome that can result from any structural or functional cardiac disorder that impairs the ability of the heart to function as a pump to support a physiological circulation. The syndrome of heart failure is characterized by symptoms such as breathlessness and fatigue, and signs such as fluid retention.

There is no single diagnostic test for heart failure, and diagnosis relies on clinical judgment based on a combination of history, physical examination and appropriate investigations (Mike Pearson., et al 2003).

Diuretics as furosemide remain the principal therapeutic agent to control pulmonary and systemic venous congestion (Sophia Antipolis., 2005).

Prolonged use of furosemide induces hypercalciuria and nephrocalcinosis (Alon et al., 1997).

Nephrocalcinosis may be detected by renal Ultrasonography in high risk infants such as those requiring prolonged furosemide therapy. Renal calcification during infancy is often asymptomatic. Gross or microscopic hematuria and increase in blood pressure may be present (Schell-Feith et al., 2000).

Renal calcification were considered an uncommon finding in children for many years, especially when radiographic detection was the mean of detection. Since the introduction of ultrasonic imaging, renal calcifications have been detected at early ages (Alon et al., 1995).

Other side effects of furosemide therapy include hypokalemia (Chvilicek et al., 1995), hypomagnesemia, hyperglycemia (Colin et al., 1999) and hyponatremia (Jackson et al., 2001).

Aim of the work

The aim of this study is to detect renal effects of prolonged use of furosemide, for more than 6 months, on cardiac pediatric patients as assessed by laboratory and sonographic examinations correlating these changes with age, sex, dose and duration of therapy as well as stage of heart failure. Early detection of deleterious effects (especially nephrocalcinosis) is mandatory to prevent their progression by replacing furosemide with another diuretic.