Pedia Companion

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A study on treatment strategy for acute myocarditis in pediatric patients requiring emergency intervention

Introduction –

Myocarditis is a disorder caused by acute or ongoing inflammation of the cardiac myocyte, which results in myocardial edoema and myocardial damage or necrosis. Myocarditis in children is most frequently caused by a viral or infectious etiology, with parvovirus-19 and human herpesvirus 6 as predominating [1]. Clinical manifestations for mild symptoms, may include like gastroenteritis or upper respiratory tract infection and chest pain, to life-threatening arrhythmias or severe cardiogenic shock. Patients with circulatory failure may require mechanical circulatory support, such as extracorporeal membrane oxygenation (ECMO) and short-term pacing[2]. The purpose of this study is to assess the importance of ECG admission data in determining the severity of acute myocarditis and establish an appropriate treatment strategy in paediatric patients.

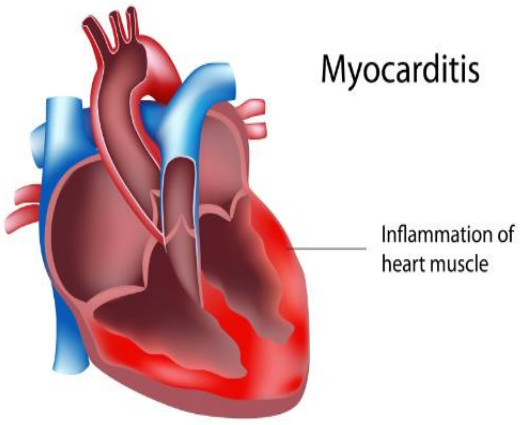

Fig.1- Myocarditis

Methods –

In this retrospective investigation, the medical records of children who had acute myocarditis were reviewed. This study comprised a total of 26 paediatric patients with acute myocarditis. Only 1 out of 26 instances had myocarditis, which was caused by parvovirus B19. First, patients were grouped according to the frequency of circulatory failure, of which 11 required emergency treatment. 15 individuals received solely medication as treatment. Second, based on the ECG results at admission, individuals in the emergency intervention group were split into two groups. These patients showed broad QRS complexes and ST-segment abnormalities. Six of the 11 patients who needed emergency treatment underwent ECMO (ECMO group) and five underwent temporary pacing (temporary pacing group) procedures.

Results –

Five out of six ECMO patients had group-wide QRS complexes with ST-segments. After receiving ECMO assistance for 4 days, a 6-year-old patient with complete atrioventricular block (CAVB) and broad QR complexes with ST-segment alterations improved (Figure 2).

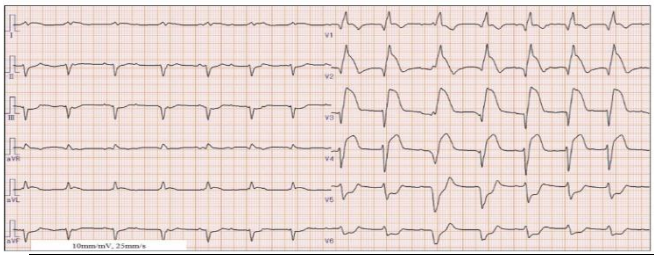

Fig. 2- Electrocardiogram of a 6-year-old patient treated with ECMO

Another patient with the same illness underwent 9 days of ECMO therapy. One patient who received ECMO for one day had a narrow QRS score with CAVB and a mildly reduced left ventricular ejection fraction (LVEF). Four patients who had ECMO for 1 to 9 days, all experienced ECMO-induced complications such as peroneal nerve palsy (three cases) and intracranial disease (one case). In the temporary group, all five patients who had syncope and convulsions showed narrow QRS, CAVB, and/or advanced AVB (Atrioventricular block). They all received pacing support treatment for 1 to 6 days and all recovered smoothly (Figure 3). All patients responded well to pacing; no one required a permanent pacemaker. 14 out of 15 patients in the non-emergency intervention group showed improvement.

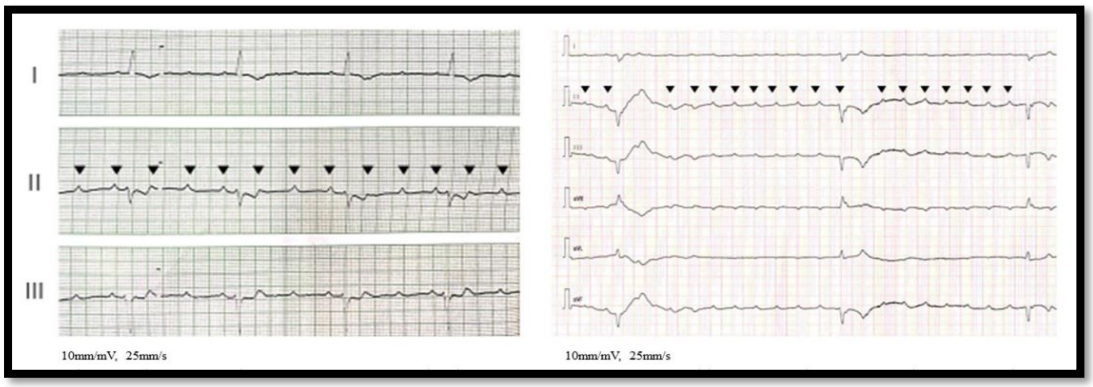

Fig. 3 - Electrocardiogram on admission in patients treated with temporary pacing

Discussion –

In this study, all 5 patients receiving ECMO and none of the patients receiving pacemakers upon admission showed broad QRS complexes with ST-segment abnormalities. Therefore, broad QRS complexes with ST-segment alterations at admission could be used to classify ECMO or temporary pacing as emergency procedures[1]. A Study by Putschoegl et al., showed that the most common ECG abnormalities in pediatric myocarditis cases were abnormal Q waves (67%), negative T waves (63%), wide QRS (58%), and abnormalities of ST segments (46%). It is clear that an abnormal ECG is nearly universal in patients with myocarditis[3]. This study showed that patients with acute myocarditis who had large QRS complexes and ST-segment alterations may be at an increased risk of circulatory failure and require ECMO support. With temporary pacing and medication, all patients with CAVB and/or advanced AVB and narrow QRS improved[1]. A study by Li et al., showed that temporary pacing is effective in treating myocarditis wherein the children reverted into normal sinus and left ventricular systolic function returned to normal. Hence proving that temporary pacemakers have definite effect, and safety in the treatment of acute and critical cardiovascular diseases in children[4].

Conclusion –

In pediatric patients with acute myocarditis undergoing emergency interventions, ECMO is required immediately in patients with wide QRS complexes with ST segment. However, in patients with CAVB and/or advanced AVB and narrow QRS, temporary pacing may be beneficial, reducing the need for ECMO.

Pacing is an effective treatment in patients with complete atrioventricular block without any complications

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A study to estimate the radiation dose during thyroid, renal, and bone scan in pediatric patients

Introduction –

Nuclear medicine imaging is a useful diagnostic tool that can benefit children as it provides information about the functioning of internal organs and tissues within the body[1]. Patients are exposed to ionising radiation in some degree through the use of nuclear medicine and other radiological procedures. Nuclear medicine plays an important role in the care of pediatric patients. They can diagnose, change management, monitor progression and assess response to therapies[2]. The judicious use of nuclear medical procedures requires balancing the radiation risks against the potential benefits[1]. This study aims to determine the effective dose for pediatric patients who underwent thyroid, renal, and bone nuclear medicine scans.

Methods –

The study comprised a total of 161 patients, with 76 (47.2%) male and 85 (52.8%) female. Patients who underwent thyroid, kidney, and bone scans provided the data. Radiation Dose Assessment Resource (RADAR), a web-based programme, was utilised to estimate the patients' effective dose and perform dose assessment. For effective levels between 3 mSv (300 mrem) and 50 mSv (5 rem), the risk is still regarded as "low".

Results –

Information about patient doses for thyroid, kidney, and bone scans was revealed in the results. The activity and effective dose for a thyroid scan were 2.89±1.12 mCi and 1.92±0.81 mSv, respectively. The activity for the kidney scan was 2.41±0.88 mCi, the effective dose was 0.72±0.19 mSv, and the activity for the bone scan was 11.46±3.64 mCi, the effective dose was 3.1±0.61 mSv. In thyroid, renal, and bone disorders, the typical activity level is higher than the optimal level. The programme RADAR and ICRP 128 were used for calculating the effective

dosages, and the findings showed slight discrepancy between the two techniques. Ionising radiation has negative effects that are widely known (Figure 1).

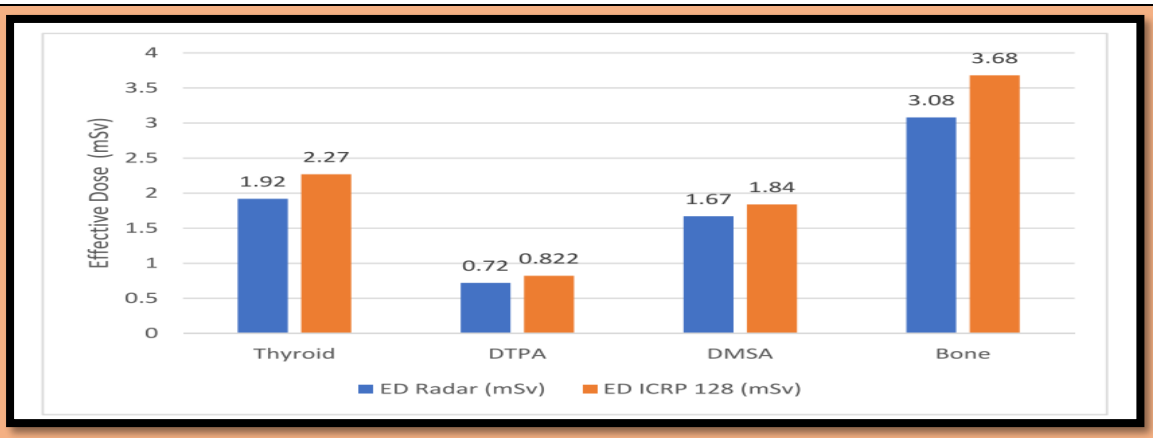

Fig.1 - Comparison of effective dose (mSv) calculated using Radar 2018 software versus ICRP-128

Discussion –

In this current study for all four scans, the average dosages for paediatric patients differed by age group. Both the DTPA measurements and the dosage levels derived from kidney tissue measurements were in agreement. For various nuclear medicine examination techniques, the mean effective dose of paediatric patients clearly differed. When the data from additional trials were compared, this discrepancy was eliminated[1]. A comparison study by Earl et al., showed different dosage depending on the age of the patient. In case of thyroid study, the mean effective dose was 1.1 mSv and mean administered activity was 17, 30.4, 50.2 for 0-5, 5 to 10 and 10-15 age group of patients. In case of bone study mean effective dose was 1.6, 2.0, 2.3 and mean administered activity was 102, 190, 314 for 0-5, 5 to 10 and 10-15 age group of patients. In case of renal study mean effective dose was 0.5, 0.4 and 0.6 while mean administered activity was 24.4, 36.8 and 51.4 for 0-5, 5 to 10 and 10-15 age group of patients[3].

Conclusion –

Study concludes that administered activity was more than the recommended activity level in thyroid, kidney, and bone patients. It does not generally mean that the examination has not been performed correctly if the administered activities and effective dose are beyond the recommended level. This study results pertains to pediatric nuclear medicine patients under 17 years of age.

Nuclear medicine imagining is non-invasive with low exposure to ionising radiation provides information about the functioning of internal organs and tissues within the body

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A study on Clinical presentations and outcomes of pancreatic biliary maljunction in different pediatric age groups

Introduction –

Pancreaticobiliary maljunction (PBM) is a congenital malformation occurs when the pancreatic and bile ducts combine outside of the duodenum wall, typically producing a lengthy shared channel (Figure 1)[1]. Bidirectional reflux of pancreatic juice and bile occurs when oddi sphincter fails to regulate the function of pancreatico-biliary junction. Pancreatitis can occur when bile flowing back into the pancreatic duct, and pancreatic juice reflux can harm the bile duct epithelium, causing biliary inflammation, stones, and even biliary cancer[2]. PBM affects women more frequently than males, with a 3:1 female-to-male ratio. The elevated risk of biliary cancer in PBM1 people is a significant problem[1]. PBM with biliary dilatation, which is known as choledochal cyst (CC), presents in a child as abdominal pain, abdominal mass, and jaundice. Hence this study evaluated clinicopathologic characteristics and outcomes in PBM children of different age groups.

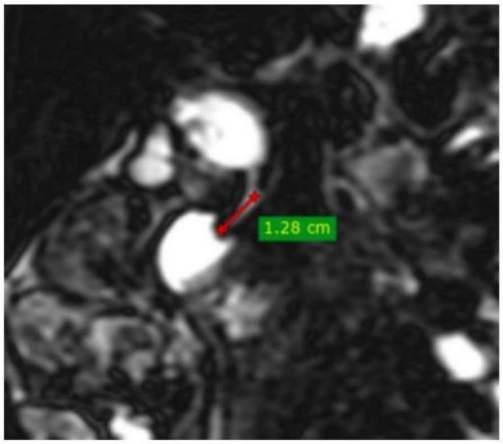

Fig.1- pancreatic and common bile ducts joining outside the duodenal wall

Methods -

This study included retrospective review of hospital records of hospitalized pediatric patients with PBM. A total of 166 children were included, who were <15 years of age. Patients were divided into three groups: group A (<1 year, n=31), group B (1-3years, n=62) and group C (>3 years, n=72). In this study, all included patients underwent excision of the extrahepatic bile duct and Roux-en-Y hepaticojejunostomy. The baseline, pre-, peri- and post-operative

laboratory values, including serum indicators of liver function and serum amylase levels, were collected.

Results –

According to the study's findings, stomach pain was the most prevalent symptom in groups C and B (91.7% and 58.7%, respectively), followed by vomiting (59.7% and 57.1%), and their incidence rates were significantly higher than those of group A (12.9% and 19.4%). In group C, stomach pain occurred more frequently. The main clinical manifestation in group A was jaundice, and group A had a considerably greater incidence of jaundice than group C (38.7% vs. 5.6%). Group C was more likely to have acute pancreatitis. The proportion of other clinical symptoms, such as fever, biliary perforation, gallstones, and CBD stones did not differ between the three groups, though (Figure 2).

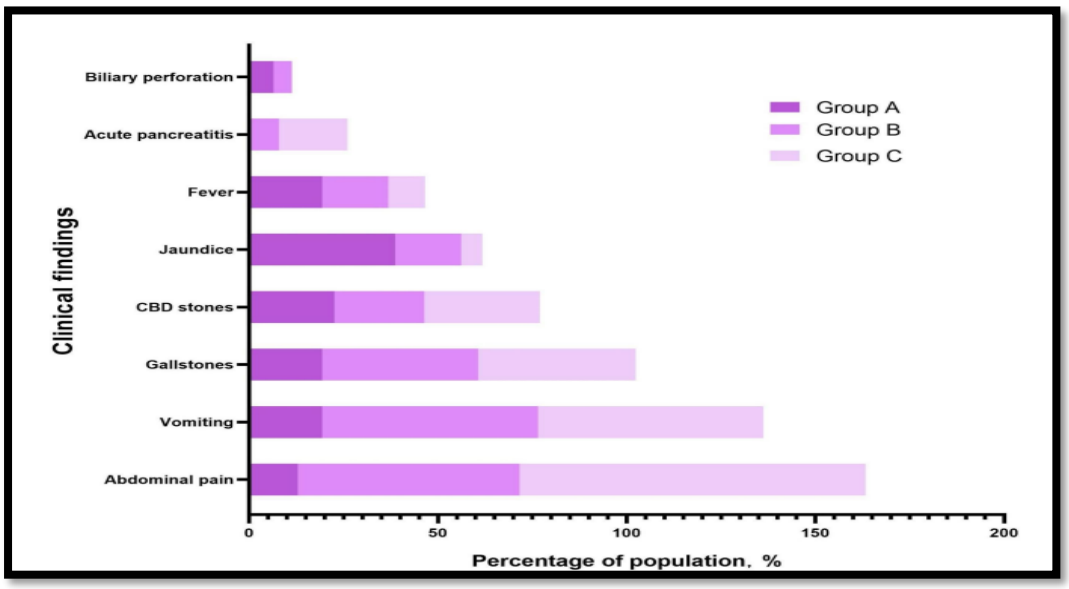

Fig.2- Clinical findings of Pancreaticobiliary maljunction in the three groups

While the maximum width of the CBD in group C was smaller than that in group A, the length of the common channel was significantly longer in group C than in group A. Group A had smaller portal vein and hepatic artery diameters than the other two groups. While groups A and B were more likely to exhibit abnormal liver function indicators, such as an increase in aspartate transaminase, alanine transaminase, and gamma-glutamyl transpeptidase, either preoperatively or postoperatively, group C was more likely to have high serum amylase.

Discussion –

Infantile PBM patients were more likely to develop jaundice, while older children (≥1year old) more commonly exhibited abdominal pain and vomiting. In addition, acute pancreatitis was noticed in older children, especially those older than 3 years. A study by Zeng et al., showed

the following clinical manifestations such as abdominal pain (62/75, 82.7%), vomiting (35/75, 46.7%), acholic stool (4/75, 5.3%), fever (3/75, 4.0%), acute pancreatitis (47/75, 62.7%), hyperbilirubinemia (13/75, 17.3%), and elevated liver enzymes (22/75, 29.3%)[3].

Conclusion –

Hence the study draws the conclusion that individuals who are infantile are more prone to

Infantile Pancreaticobiliary maljunction patients were more likely to develop jaundice, while older children (≥1year old) more commonly exhibited abdominal pain and vomiting.

exhibit jaundice, abnormal liver function indicators, and even liver fibrosis, which are mostly brought on by obstructive cholangiopathy. The most common causes of cholangitis and pancreatitis, which result in nausea and vomiting in older PBM patients, are bidirectional reflux and hyperamylasaemia.

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A case on Kawasaki disease associated with bilateral severe hearing loss following cochlear implantation

Introduction –

Kawasaki disease (KD) is defined as a rare systemic inflammatory disease that predominately affects young children less than 5 years of age[1]. More cases of sensorineural hearing loss (SNHL) linked to KD have been documented[2]. SNHL is the most common type and accounts for majority of all hearing loss. The reversible SNHL associated with KD typically manifests within the first 30 days of the disease's start. Delays in cognitive and linguistic development may result from bilateral SNHL with poor prognosis and KD[2]. The current case describes a reports of 4-year-old patient with KD who also had bilaterally severe SNHL that worsened over the course of two years. It also demonstrates the effectiveness of cochlear implantation for SNHL associated with KD.

Case presentation –

A 4 years old male patient with no clinical or family history developed KD. From the day4 after onset of disease treatment began with intravenous immunoglobulins (IVIG) and oral aspirin (30 mg/kg/day). Patient was persistently febrile and was treated with cyclosporine and subsequent oral prednisolone. Blood investigation showed the persistent elevation of white blood cell (WBC) count and C-reactive protein (CRP), anemia and thrombocytosis during the treatment for KD. After 130th day onset of KD, his family noticed that patient had impaired hearing. On the 141st day after onset of KD, patient was presented to the otorhinolaryngology-head and neck surgery department where the audiometric tests showed right side moderate and left side severe sensory hearing loss. Treatment was immediately started with intravenous prednisolone (gradually reduced from 0.6 mg/kg), but there was no significant improvement of hearing loss on either side. On 510th day after the first onset, there was relapse of KD. Patient recovered after immediate IVIG treatment, but right-side SNHL worsened. After treatment for KD, systemic steroid treatment was done for right-side SNHL, but there was no improvement of hearing loss, rather, there was progressive deterioration. Blood reports showed persistent mild anemia and thrombocytosis. Finally, the patient developed severe hearing loss on the right side of ear (Figure 1).

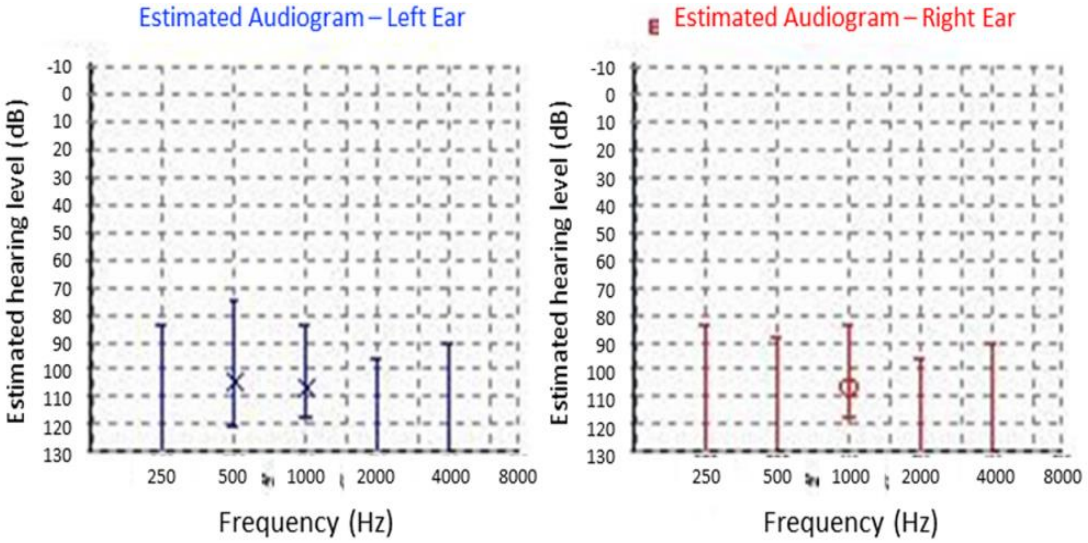

Fig.1- Auditory steady-state response test

Even after using hearing aids on both sides patients mental state subsequently became very unstable due to a lack of auditory communication, so cochlear implant was done for left ear after 1065th day onset of KD. After cochlear implantation, auditory communication skills dramatically improved and mental status stabilized. One year after the surgery, a play audiometry test showed marked reduction in threshold at all frequencies compared with that without cochlear implant. Speech audiometry showed 90% of maximum speech discrimination score with the cochlear implant (Figure 2). Hence cochlear implantation was recommended to the other side considering advantages in young children of bilateral stimulation regarding speech understanding in noise, sound source localization and speech intelligibility.

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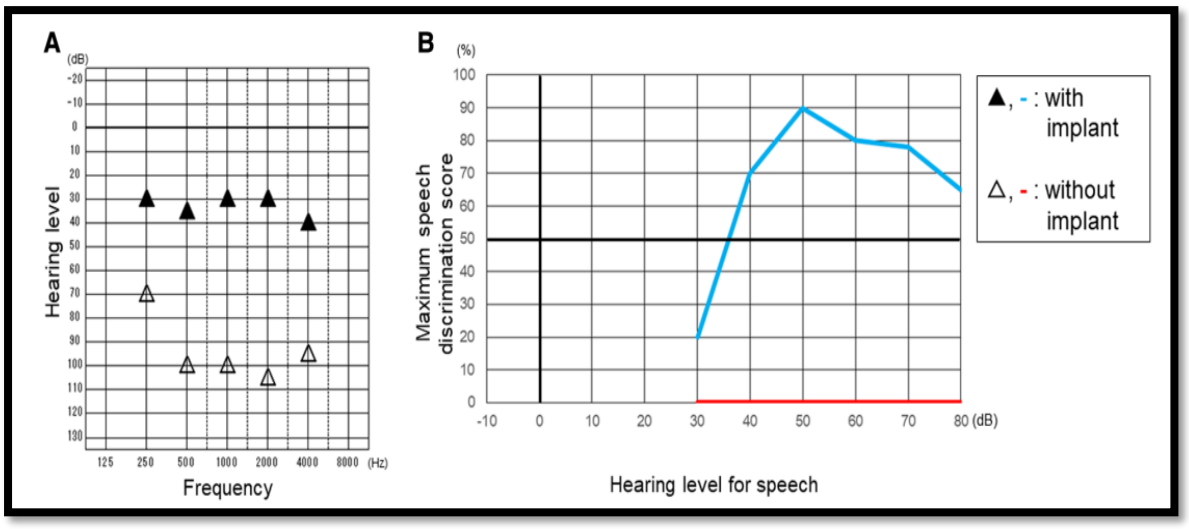

Fig.2- Play audiometry test (A) and speech audiometry (B) after cochlear implantation

Discussion –

The Current case provided two important clinical suggestions: First, SNHL linked to KD may worsen over time and lead to profound hearing loss. Second, the effectiveness of cochlear implantation for bilateral severe SNHL coupled with KD was shown. SNHL is reversible and typically manifests during the acute or subacute phases of KD. In this instance, 510 days after the initiation of KD, the patient experienced acute hearing loss. Prednisolone therapy had no effect on the hearing loss. The patient's mental state stabilised and his auditory communication abilities significantly improved after cochlear implantation[2]. A similar case report of 12 years old female patient diagnosed with KD showed SNHL since 1.5 years after the episode of febrile illness. The patient was administered with Immune Globulin intravenously and aspirin. The patient reported reduced hearing sensitivity, ear pain, blocking in both ears, and tinnitus (intermittent) in the left ear. Hence the study emphasizes that health care professionals should also be aware of this possible combination of hearing loss and vestibular manifestation in KD and should perform audiometric screening in suspected patients[3].

Conclusion –

This case suggests the importance of long-term auditory follow up among patients with KD, especially for children during the cognitive and speech development. Hence Cochlear implantation could be an effective therapeutic option for patients with SNHL associated with KD.

Cochlear implantation could be an effective therapeutic option for patients with Sensorineural hearing loss associated with Kawasaki disease.

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