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Myocarditis after Diphtheria-Tetanus-Whole Cell Pertussis and Polio Vaccination: Case Report

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Myocarditis is a process characterized by inflammatory infiltrate of the myocardium with necrosis and degeneration of myocytes. Although most cases of myocarditis are related to viral infections such as coxsakievirus B and echoviruses, immunization (vaccination) may induce myocarditis.
Cardiac complications after routine vaccination such as myocarditis, pericarditis are rarely seen. Myocarditis associated with diphtheria-tetanus-whole cell pertussis and polio vaccination is extremely rare in childhood.
In this report we described a-2-months old boy who developed myocarditis 3 days after diphtheria-tetanus-whole cell pertussis and polio vaccination. Patient's clinical condition was improved but cardiac functions weren't changed despite the ibuprofen and steroid treatment.
Key Words: Myocarditis, Diphteria-Tetanus- Whole Cell Pertusis and Polio Vaccination

Difteri-Tetanoz-Tam Hücreli Boğmaca ve Poliyo Aşılamasından Sonra Miyokardit: Vaka Sunumu

Özet: Miyokardit miyositlerde dejenerasyon ve nekrozla birlikte miyokard dokusunda inflamasyonla karakterize bir durumdur. Miyokardit olgularının birçoğu başta coxsakievirus tip B and echovirus ile ilişkili olmasına rağmen aşılama sonrası miyokardit görülebilmektedir. Aşı sonrası nadiren miyokardit, perikardit gibi kardiyak komplikasyonlar nadiren görülmektedir. Difteri, tetanoz, poliyo ve tam hücreli boğmaca aşısı sonrası gelişen miyokardit çocukluk döneminde oldukça nadir olarak bildirilmektedir.
Bu yazıda tetanoz, poliyo ve tam hücreli boğmaca aşısı yapıldıktan 3 gün sonra miyokardit saptanan bir olgu tartışılmıştır.
Anahtar Kelimeler: Miyokardit, Difteri-Tetanoz- Tam Hücreli Boğmaca-Polio Aşısı

Myocarditis is a process characterized by inflammatory infiltrate of the myocardium with necrosis and degeneration of myocytes. Although most cases of myocarditis are related to viral infections such as coxsakievirus B and echoviruses, other etiologies such as nonviral infectious agents, various drugs, hypersensitivity, and autoimmune disorders may be a cause.[1]

Immunization may induce cardiovascular complications such as myocarditis and pericarditis. Cardiovascular complications due to vaccination are rare and most of these cases which were reported in pediatric ages are related to smallpox vaccination.[2]

Myocarditis related the other vaccinations such as diphtheria-tetanus-whole cell pertussis (DTP) and polio vaccination is extremely rare. There was one child who had myocarditis related to diphtheria-tetanus-whole cell pertussis (DTP) and polio vaccination in childhood reported in the literature.

In this report, we described a 2 months old baby who had myocarditis after diphtheria, tetanus, whole cell pertussis and polio vaccination.

CASE REPORT

A-2-months old baby was addmitted to our hospital emergency department due to respiratory distress, tacypnea and tacyhcardia. We learned that he received a first dose of DBT and (Serum Institute of India ltd) and polio vaccines (Panacea Biotec ltd) 3 days before admission. He had no history of autoimmune disorder, no previous flu-like illness with diarrhea and/or respiratory symptoms suggestive of an infectious disease.

On admission, physical examination showed that fever was 37,8 ^{0}C, weight was 5 kg (25-50 percentile), lenght was 54 cm (50 percentile), heart rate was 160/minute, blood pressure was 60/40 mmHg. Patient had peripheral type cyanosis, tachycardia, gallop rhythm and hepatomegalia.

Sinusal tachycardia was found on ECG. There were no voltage supression and ST-T changes on ECG. Telecardiogram revealed cardiomegaly with pulmonary congestion. Two-dimensional and color coded echocardiogram (Vivid-Pro 7, GE) showed that left ventricle was diffuse enlarged (left ventricular end diastolic diameter was 34 mm and left ventricular end

systolic diameter was 25 mm), there was 2 nd degree mitral insufficiency, and left ventricular systolic functions were diminished (ejection fraction was 42% and fractional shortening was 19%) (Figure 1 and 2).

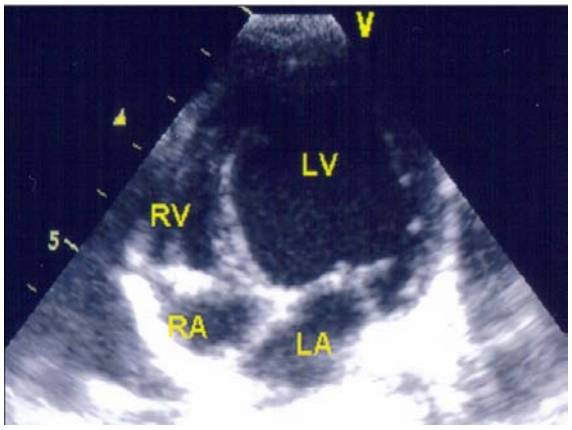

Figure 1. Apical four chamber view of 2D echocardiography shows dilated left ventricle.

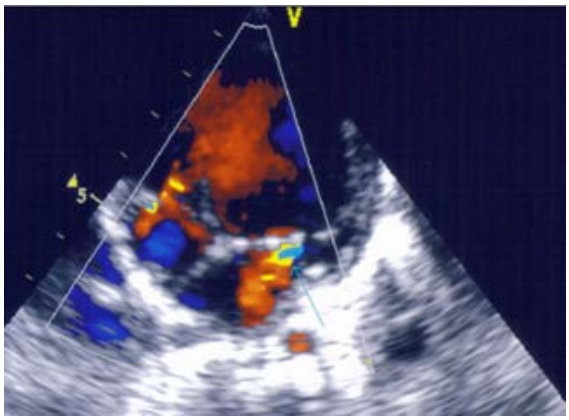

Figure 2. Color flow imaging shows 2nd degree mitral insufficiency.

There were no structural heart diseases and coronary arteries were also normal.

Laboratory findings showed that serum cardiac enzyme levels were elevated; troponin I was 0.86 ng/mL (range: 0.02-0.5 ng/mL), creatine kinase was 1541 U/L (range:0-171 U/L), creatine kinase-MB was 75 U/L (range: 0–24 U/L), and AST was 266 U/L (range: 15-60 U/L).

Other laboratory findings included a white blood cell count was of 7,6 x 10^9/L (with 18% neutrophils, 76% lymphocytes, and 6% eosinophils), hemoglobin level was 9,1 g/dL, erythrocyte sedimentation rate was 17 mm/hour, high sensitive C-reactive protein level was 3,0 mg/L (range:0-3 mg/L). Serological screening for adenovirus, respiratory sinsitial virus, rubella, cytomegalovirus, Epstein-Barr virus, and *Mycoplasma pneumoniae* were normal. IgE level was in normal limits.

The patient was followed-up in intensive care unit and was treated with dopamin, dobutamine, diuretic and ibuprofen. After a 7 days period, patient's clinical status was improved and cardiac enzyme levels were returned to normal level but left ventricular ejection fraction and fractional shortening were still diminished (30% and 13%, respectively). That's why, ibuprofen treatment was stopped and metylprednisolone treatment was started as 2 mg/kg/day. Cardiac functions were not changed after 1 week period with steroid treatment and patient was discharged with steroid, digoxin, enalapril and diüretic treatments. We planned to diminished the steroid dose after 2 weeks period.

DISCUSSION

Myocarditis is inflammation of the myocardium. Viruses are probably the most common causes of myocarditis. The most common viral causes include adenovirus and enteroviruses (coxsackieviruses A and B, echovirus). Myocarditis are also related to hypersentivity reactions, immune mediated diseases, collagen vasculary diseases, and toxins. The principal mechanism of cardiac involvement in viral myocarditis is believed to be a cell mediated immunologic reaction and direct viral replication.[1]

Myocarditis is rarely seen after vaccination. Myocarditis after smallpox, *Salmonella typhi* or *paratyphi* A and B vaccinations have been reported. Eckart RE, et all showed that a total of 540,824 military personnel were vaccinated with a New York City Board of Health strain of vaccinia from December 2002 through December 2003.[3] Of these, 67 developed myopericarditis at 10.4 ±3.6 days after vaccination. This study revealed that the ST-segment elevation was noted in 57% of patients, mean troponin level on admission was 11.3± 22.7 ng/dl, and the peak level of cardiac enzymes were noted within 8 h of presentation. On follow-up of these 64 patients at a mean of 32 +/- 16 weeks, all patients had objective normalization of echocardiography, electrocardiography, laboratory testing, graded exercise testing, and functional status; 8 (13%) reported atypical, non-limiting persistent chest discomfort.

Thanjan MT, et all reported a postvaccination acute myopericarditis in a 17 years old adolescent.[4] The patient presented with acute chest pain, diffuse ST-segment elevation, and elevated cardiac enzyme levels after DtaP, meningococcal conjugate, and hepatitis A vaccination. Wu SJ, et all described an infant case of acute fulminant myocarditis which occured after diphteria, polio and tetanus vaccination.[5]

This patient required extracorporeal membrane oxygenation and died 2 months later. Amsel SG, et all described a 3 month old infant who developed

myocarditis several hours after diphtheria, tetanus, and pertussis vaccination.[6] Boccara F, et all reported an adult case of myopericarditis after triple vaccination against diphtheria, tetanus, and poliovirus.[7] He presented with fever, acute chest pain, and diffuse ST-segment elevation 2 days after vaccination. Two-dimensional echocardiography findings were normal but endomyocardial biopsy showed interstitial edema with diapedesis of erythrocytes. Laboratory findings showed inflammatory syndrome and elevated circulating immune complexes.

The proposed mechanism of myocarditis after vaccination is a hypersentivity reaction. Pathogenesis is related to a maladaptive immune response that leads to myocardial injury, as evidenced by biopsy specimens in cases of myocarditis after smallpox vaccination that have revealed CD3+ T cell infiltrate with prominent degranulating eosinophils.[8]

In our case, the time of occurrence of symptoms, the clinical course, and the negative virological studies suggest a possible cardiogenic adverse reaction to the DBT and polio vaccine. In our country, diphtheria, tetanus, whole cell pertussis and polio vaccines are routinely used and recently whole cell pertussis vaccine changed as acellular vaccine in vaccination schema. 0.5 ml DTP vaccine (serum Institute of India ltd) includes diphtheria toxoid **(≤** 25lf**, ≥**30IU), Tetanus toxoid (≥5lf, ≥40IU), *Bordetella pertussis* (≥4 IU), thiomersal 0.01% and aluminum phosphate (≥1.5 mg). Polio vaccine (Panacea Biotec ltd) includes live attenuated sabin strain type 1, 2, 3 and is stabilized with $MgCl_2$. It also includes kanamycin and neomycin sulphate. In our case, routine screening for some infectious etiology were normal. We couldn't perfomed serological tests for echovirus, coxsackieviruse. The clinical bias of our patient that myocarditis may be a coincidental finding in our patient. White blood count, CRP and sedimantation levels were normal in our patients and there were no history of infectious disease such as respiratory diseases, gastroenteritis and acute exhanthematous diseases. That's why, in our patient myocarditis strongly related to vaccination and hypersensitivity is the probable mechanism for etiology of myocarditis related vaccination or its components. That's why; we will postpone the next doses of diphtheria, tetanus, pertussis and polio vaccines.

The role of treatment for myocarditis related to vaccination is not clear. Patients are either not treated or nonsteroidal anti-inflammatory drugs and corticosteroids are used in cases of more severe clinical presentation. Although most reported cases of post vaccination myopericarditis are self-limited, clinical presentation is severe in children than the adult patients.[5,6] Clinical status of our patient improved but cardiac functions were not changed with ibuprofen and steroid treatment.

REFERENCES

1. Park MG. Pediatric Cardiology for Practitioners, 4th ed. St. Louis, Mosby, 2002. Cardiovascular infections. pp 289-90.
2. Moschos A, Papaioannou AC, Nicolopoulos D, Anagnostakis D. Cardiac complications after vaccination for smallpox. Helv Paediatr Acta 1976; 31(3):257-60.
3. Eckart RE, Love SS, Atwood JE, et al. Incidence and follow-up of inflammatory cardiac complications after smallpox vaccination. J Am Coll Cardiol 2004; 44(1):201-5.
4. Thanjan MT, Rmaswamy P, Lai WW, Lytrivi ID. Acute myopericarditis after multiple vaccinations in an adolescent: case report and review of the literature. Pediatrics 2007;119(6):1400-3.
5. Wu SJ, Sun S, Li JY, Hu PY, Chien CY. Acute fulminant myocarditis after Diphteria, polio, and tetanus vaccination. Asian Cardiovasc Thorac Ann 2006;14(6):112-2.
6. Amsel SG, Hanukoglu A, Fried D, Wolyvovics M. Myocarditis after triple immunisation. Arch Dis Child 1986;61(4):403-5.
7. Boccara F, Benhaiem-Sigaux N, Cohen A. Acute myopericarditis after diphteria, tetanus, and polio vaccination. Chest 2001;120(2):671-2.
8. Murphy JG, Wright RS, Bruce GK, et al. Eosinophilic-lymphocytic myocarditis after smallpox vaccination. Lancet 2003;362: 1378 –1380.

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