



Case Series

CASE SERIES ON MUMPS MYOCARDITIS HIGHLIGHTING THE NEED OF INTRODUCTION OF MMR VACCINE TO NIS

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ABSTRACT

Mumps is a vaccine preventable disease that usually occurs as parotitis and spreads by respiratory droplets. Most common complications of mumps in children are orchitis, meningitis, encephalitis, pancreatitis, hearing loss. Cardiac involvement has been considered rare but clinically significant complication of mumps infection. Through this paper we are reporting four cases of probable myocarditis in mumps patients (3 mumps suspect and 1 probable mumps). This is a prospective observational study conducted during hospital stay of the selected cases. All the cases had similar presentation with h/o parotitis which was followed by myocarditis. Myocarditis was confirmed by bedside 2D ECHO. In India very limited data is available on burden of mumps and mumps myocarditis. Mumps outbreaks have been reported from various states every 5 years and mumps vaccine is not included in national immunisation schedule(NIS). This study highlights the importance of addition of mumps vaccine to NIS and suspecting myocarditis in patients presenting with oedema, respiratory distress and cardiogenic shock in the setting of mumps. Early recognition of the symptoms and prompt treatment improves prognosis, prevents death from this serious complication.

Key Words: Mumps, Myocarditis, Cardiogenic Shock, Congestive Cardiac Failure, MMR Vaccine.

INTRODUCTION

Mumps is an acute, self-limited, vaccine preventable, systemic infection that is "classically" characterized by fever and swelling of one or more salivary glands; usually the parotid glands.

It is caused by the Mumps virus, a member of paramyxoviridae family and rubulavirus genus¹. Humans are the only known host for mumps virus. Historically, the peak incidence of mumps was between January and May and among children younger than 10 years. Mumps is spread by direct contact or by airborne droplets from the upper respiratory tract of affected individuals. The incubation period is usually 16 to 18 days, but cases can also occur from 12 to 25 days after exposure. The period of maximum

communicability begins several days before the parotitis onset. An isolation period of 5 days after the onset of parotid swelling is recommended¹. However, virus has been detected in patients' saliva as early as 7 days before till 9 days after the onset of swelling.

COMPLICATIONS ASSOCIATED WITH MUMPS

The signs and symptoms of mumps are usually milder with less complications among the vaccinated population. The most common complication is orchitis and is seen in 30% of unvaccinated post pubertal men. More than 50% mumps cases have CSF pleocytosis but less than 1% have signs of viral meningitis. Other complications of mumps encompass conditions like oophoritis, pancreatitis, mastitis and deafness. Occasionally, myocarditis, nephritis, seizures,

cerebellar ataxia and cranial nerve palsies have also been reported¹.

Burden of Mumps in India

Although mumps is so widely prevalent in India, it is not considered as a significant public health problem; mainly because of poor documentation of cases. More than 90% cases in India go unreported. Cases of mumps have been increasing sharply, specially in countries like Kerala, Maharashtra, Telangana, Andhra Pradesh, Rajasthan and New

Delhi. Since the beginning of 2024 till 30 March, a cumulative of 18158 cases have been reported².

Case Study

Here we report 4 cases of probable myocarditis³ (as defined in table 01) with a history of mumps infection. Out of these 4 cases, 3 were cases of suspected mumps and 1 was probable mumps (as per CDC definition of mumps 2024)⁴. All were admitted in GMCH Miraj, under the department of pediatrics in the time period from July to December 2024.

Table 1: A 3-tiered clinical classification for the diagnosis of myocarditis based on the level of diagnostic certainty.

	criteria	Histologic confirmation	Biomarker, electrocardiography (ECG), or imaging abnormalities consistent with myocarditis	Treatment
Possible subclinical acute myocarditis	In the clinical context of possible myocardial injury without cardiovascular symptoms but with at least one of the following: 1. Biomarkers of cardiac injury raised 2. ECG findings that suggest cardiac injury 3. Abnormal cardiac function on echocardiogram or cardiac MRI	Absent	Needed	Not known
Probable acute myocarditis	In the clinical context of possible myocardial injury with cardiovascular symptoms and at least one of the following: 1. Biomarkers of cardiac injury raised 2. ECG findings that suggest cardiac injury 3. Abnormal cardiac function on echocardiogram or cardiac MRI	Absent	Not needed	Per clinical syndrome
Definite myocarditis	Histologic or immune histologic evidence of myocarditis	Needed	Not needed	Tailored To Specific cause

CASE 1

9 year old female child, 1st issue from a 3rd degree consanguineous marriage, completely immunized as per the National Immunization Schedule presented with history of generalized edema, noticed 2 to 3 days prior to admission.

There was history of bilateral parotid swelling with fever, 15 days prior to admission.

At admission patient was in decompensated shock with signs of CCF. Bedside 2D ECHO was suggestive of severe biventricular dysfunction with ejection fraction (EF%) of 10 -15% and dilated cardiomyopathy secondary to viral myocarditis.

Patient was managed with iv diuretics, inotropes and mechanical ventilation. Cardiac markers were significantly raised. IVIG was given for 2 days and IV Methyl prednisolone (MPS) was given. However patient succumbed after 1 week of admission.

CASE 2

A 9 yr old female child, 2nd issue of a 3rd degree consanguineous marriage, immunized as per the National immunization schedule, presented with chief complaints of fever, abdominal pain, vomiting and fast breathing for 3 to 4 days. History of bilateral parotid gland swelling was present 1 month prior to admission.

Child was in decompensated shock and congestive cardiac failure at admission. Cardiomegaly was

present on chest x-ray and ECG showed ST segment elevation. Bedside 2D ECHO was suggestive of severe LV dysfunction with ejection fraction of 5-10%, dilated cardiomyopathy secondary to viral myocarditis. Cardiac markers were significantly raised.

Patient was managed with restricted Iv fluids, inotropes, iv decongestants. IVIG and IV Methyl Prednisolone were given. Repeat 2D ECHO after 1 week showed slightly improved EF of 10-15%.

Child was started on oral diuretics, cardiac remodelling drugs, along with Aspirin and discharged home.

CASE 3

A 10 yr old female child, 4th issue from a non-consanguineous marriage, immunized as per the NIS, came with history of left parotid swelling for 15days with fever for 3 days. Patient then had increased respiratory efforts with 1 episode of seizure and altered sensorium. Patient had signs of CCF, no meningeal signs.

2D ECHO showed severe biventricular dysfunction with LVEF of 10 to 15%, Dilated cardiomyopathy secondary to viral myocarditis. CSF examination was normal. Cardiac markers showed significantly raised Pro BNP levels.

Patient was started on iv decongestants, inotropes with fluid re- striction. Review 2 D ECHO after 1 week showed increased LVEF of 25- 30% with

moderate biventricular dysfunction. Patient was discharged on oral medications.

CASE 4

A 8yr old female child, 2nd issue born out of a non-consanguineous marriage, immunized as per the NIS, presented with generalized oedema for 2-3 days and increased respiratory efforts for 1 day. There was history of Mumps infection 1month back.

Child had signs of CCF at admission. 2D ECHO showed moderate LV dysfunction with LVEF of 30-35%. Serum Mumps IgM antibody was positive.

She was started on iv diuretics and inotropes. IVIG and IV methyl prednisolone were given. Follow up 2D ECHO after 1 week showed improvement in

LVEF to 35-40%. Patient was discharged home on oral medications.

RESULTS

Here we highlight 4 cases (3 mumps suspect and 1 probable mumps) all with a very rare complication of myocarditis.

The incidence of mumps cases peaks during winter and spring season between January to May all over the world. But in our patients mumps was seen during July to December months. The disease occurs predominantly in children between 5-15 years and there is no gender predilection for mumps, but CNS complications are more frequent in males.⁵ In our study all patients were female children in the age group of 8-10 years and all of them had CVS complications.

Table 2: Epidemiology

Data	Case 1	Case 2	Case 3	Case 4
Age (year)	9	9	10	8
Sex	Female	Female	Female	Female
History of cardiac disease	No	No	No	No
Immunisation till age	Yes	partially immunized	Yes	Yes
Immunisation status of other children in the family	Yes	Yes	Yes	Yes
History of mumps	15 days back	1 month back	3 days back	1 month back
Month of mumps infection	August	September	July	December
History of Mumps contact	No	No	No	No
Socioeconomic status (as per modified kuppuswamy scale)	5	4	4	5
Overcrowding	Yes	No	Yes	Yes

All had received the 9th and 15th month vaccine as per NIS and had a previously normal cardiac profile. All had past history of mumps within 1 month of admission. All patients belonged to class 4-5 of Modified kuppuswamy scale⁶. 3 patients had overcrowding in the household⁷. The most common

presentation in these patients was generalised oedema, with respiratory distress. and all had features of CCF at admission. 2D ECHO confirmed ventricular dysfunction and all cases were categorized as probable myocarditis³.

Table 3: Clinical Findings

Data	Case 1	Case 2	Case 3	Case 4
Mumps case category	Mumps suspect	Mumps suspect	Mumps suspect	Probable mumps
Myocarditis category	Probable case of myocarditis	Probable case of myocarditis	Probable case of myocarditis	Probable case of myocarditis
Pro BNP	>35000	>35000	>35000	27000
CK MB	93	11	27.5	34
ferritin	475	18	43	21
LDH	1012	781	328	634
ECG	Low voltage complexes	ST elevation with T wave depression	Low voltage complexes	Normal
2D ECHO	Severe bi ventricular dysfunction	Severe LV dysfunction	Severe bi ventricular dysfunction	Moderate LV dysfunction
EF%	10-15%	5-10%	10-15%	30-35%

Immunosuppressive and anti-inflammatory treatment was given to 3 patients along with inotropic support and diuretics. 1 patient was managed with inotropes and diuretics alone. Serial

Pro BNP values and review 2d echo were done to monitor effectiveness of treatment. 3 Out of 4 patients improved while 1 patient succumbed.

Table 4: Treatment Given

Data	Case 1	Case 2	Case 3	Case 4
Treatment given	IVIG MPS Milrinone	IVIG MPS Milrinone	IVIG MPS Milrinone	IVIG MPS Milrinone

	Dobutamine Lasix	Dobutamine Lasix	Dobutamine Lasix	Dobutamine Lasix
Duration of hospital stay	12 days	10 Days	14 Days	15 Days
Outcome	Death	Discharge	Discharge	Discharge
EF% on follow up	5-10%	10-15%	25-30%	35-40%

DISCUSSION

It was originally thought that mumps did not involve the heart. A possible link was first described in 1918 by Pujol *et al.*⁸. Several case reports have described a variety of mumps induced cardiac illnesses including pericarditis, complete heart block, myocarditis and cardiogenic shock requiring a circulatory Assist device.

Cardiac complications were very rarely described in the pre-vaccination era. Older review articles demonstrate an incidence of 4.4% of ECG changes in acute Mumps infection, whereas only few case reports and small case series, describe myocarditis and pericarditis.^[9-10]

A Mumps vaccine was developed in 1967 and adopted widely in 1980s. In India it was not included under the National Immunization Programme, but was included in various State Immunization Programmes by states like Delhi in 1999.

The incidence of complications secondary to Mumps has fallen drastically since then. Only isolated case reports of Mumps myocarditis exist, predominantly in individuals not vaccinated with the Mumps component. Only 4 cases have been identified from 1999 to 2018, all in unvaccinated patients.^[10]

The National Technical Advisory Group on Immunization (NTAGI) observed that since the "disability component" of mumps is not a serious public health problem and since the addition of mumps component to Universal Immunization Programme (UIP) would result in a substantial increase (more than twice than that of Rubella vaccine) in cost without commensurate public health benefits, so MR vaccine was introduced instead of MMR.^[11]

Countries like USA after having introduced one dose of mumps containing vaccine in the National schedule, observed an epidemiological shift in the age group of the affected patients with more epidemics occurring in adolescents and young adults.^[12] This was attributed to waning of the vaccine induced immune response which is considered weaker than the naturally acquired one. Inclusion of 2 doses of mumps containing vaccine in their national schedule has led to a drastic decline in the number of mumps cases.

For the treatment of Mumps myocarditis, there is insufficient data in children to permit evidence based recommendations for myocarditis specific immunotherapy (IVIG and steroids).^[13] Its use is reported in various studies and used when patients present in acute decompensated phase. Immunotherapy has anti-inflammatory, antiviral

and immunomodulatory effects and considered safe by most paediatricians.

A National registry study by Lin MS *et al.*,^[14] used propensity matching to compare IVIG and steroids separately with no treatment and showed no difference in in-hospital survival. A review of data from the Paediatric Cardiomyopathy Registry (PCMR) found that immunotherapy was frequently used in paediatric myocarditis, but there was no association of treatment with survival or normalization of function at follow-up.^[15] However the authors acknowledged that the study was not specifically powered for that analysis. One non-randomized controlled study by Bhatt GS *et al.*,^[16] treated children with clinical myocarditis in the setting of acute viral encephalitis with IVIG alone and showed dramatic improvement in echocardiography and survival. In our study, we have managed 3 patients with immunotherapy and one patient with supportive management. Improvement in ejection fraction was seen in both the groups.

CONCLUSION

Mumps despite being a widely prevalent disease in India, is considered as an insignificant public health problem mainly because of poor documentation of clinical cases and lack of published studies. In the absence of adequate published data on disease burden we missed to introduce Mumps vaccine to the NIS. It's the need of the hour to introduce the mumps vaccine in our NIS.

Myocarditis in children is a challenging condition to diagnose and manage and its impact on morbidity and mortality is significant. With its heterogenous presentation and outcome there should be a high index of suspicion. Further studies are required to guide for the recommendations on myocarditis specific immunotherapy.

Limitations

Study being conducted in a government institute confirmatory test for diagnosis of mumps cases as per CDC case definition was not done due to financial constrains, hence suspect and probable cases of mumps were included in the study.

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