

Original Research Article

Clinical course, complications, immunization status and outcome of mumps in children

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Received: 07 January 2023

Accepted: 13 February 2023

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ABSTRACT

Background: Mumps is a self-limiting viral disease in children which usually resolve within 10 days. It is characterized by fever, constitutional symptoms and swelling of the parotid gland(s) and may lead to serious complications. The most common complication is orchitis, followed by meningitis. Less common complications include pancreatitis, encephalitis, deafness, mastitis, oophoritis, and facial Bell palsy.

Methods: This is a hospital-based Prospective observational study where children age ≤ 18 years who presented with mumps were studied for immunization status, clinical course, complications and outcome.

Results: Fever was the most common presentation followed by parotid involvement. The mean duration of illness was 9 ± 2 days. Constitutional symptoms like headache, myalgia or fatigue were seen in 90 patients (60%). The most common complication seen was orchitis and tonsillitis, 4 cases (2.7%) each followed by pancreatitis (2%), febrile seizures (2%) and meningitis (2%). The least common was myocarditis (0.7%). Only 10 (6.7%) of the patients were hospitalized and none died. All the patients were cured within 2 weeks and without any sequels. The average loss of school days (school absentee) were 8 days. These complications were seen only in non-immunized patients.

Conclusions: The benefits of vaccination against mumps in addition to rubella and measles would be a logical public health intervention that would have a significant clinical and economic benefits and to prevent complications of mumps.

Keywords: Complications, Orchitis, Vaccination

INTRODUCTION

Most cases of mumps are self-limiting and resolve within 10 days. However, complications from the mumps can occur in 10%-40% of infected individuals.^{1,2} The most common complication is orchitis, followed by meningitis. Less common complications include pancreatitis, encephalitis, deafness, mastitis, oophoritis, and facial Bell palsy.³ Individuals who have received a single mumps vaccine have a lower incidence of complications than those who have not been vaccinated. Additionally, individuals who received 2 vaccinations against the mumps seemed to have more protection from complications than individuals who received only a single dose of vaccine. This is consistent with findings of complication rates between 10%-15% in individuals who

received at least 1 dose of MMR vaccine and complication rates up to 40% in individuals who had not been vaccinated.^{2,4}

Orchitis is the most common complication of mumps and occurs in 15%-30% of unvaccinated males and around 10% in vaccinated males.^{2,4} Young pubertal and post-pubertal males between the ages of 15 and 34 are at the highest risk.²¹ Orchitis typically occurs 10 days after the onset of parotitis and is most often unilateral. However, orchitis has been known to occur up to 6 weeks after infection and can present bilaterally. Treatment of mumps orchitis consists mainly of supportive treatment for pain. Hospitalization for orchitis is rare, and patients with orchitis are typically only hospitalized for pain relief when severe testicular pain occurs.¹ Meningitis is the

second most common complication of mumps with an incidence of up to 10%; however, meningitis has not been addressed outside the hospital setting in recent literature.⁴ Hospitalization of patients with meningitis mumps may occur in up to 4% of individuals. The vaccine offers protection against severity of meningitis mumps with only 0.5% who had received at least a single dose of mumps vaccine required hospitalization, while 4% of those who had not received a mumps vaccine required hospitalization with meningitis mumps.^{2,4}

Hearing loss is a rare complication of mumps and may occur in 1% of individuals infected with mumps. Hearing loss occurs during the second week of mumps infection and may occur alone or with meningitis mumps or encephalitis. Pediatric patients are at the highest risk for experiencing hearing loss after mumps. Hearing impairment associated with mumps is typically unilateral and irreversible.⁵ Vaccination against the mumps appears to have protective qualities against hearing loss as more profound hearing loss is noted in unvaccinated individuals.⁵ Any individual that experiences hearing loss with mumps should be evaluated by an ear, nose, and throat specialist due to possible cochlea damage.⁵ Complications of pancreatitis, encephalitis, mastitis, oophoritis, and facial Bell palsy are rare occurring in only approximately 1% of individuals. All patients diagnosed with mumps should be monitored for complications due to possible serious sequela.^{2,4,5} Individuals with complications of meningitis, encephalitis, mastitis, oophoritis, and facial Bell palsy do not require special treatment due to mumps virus and should be treated per current specific condition recommendations.

Immunity is the most effective way to prevent mumps.⁶ Before routine vaccination, 90% of all children had acquired mumps by age 15 months, resulting in lifelong immunity.^{7,8} This lifelong immunity was demonstrated in 95% of adults who had the mumps virus as a child and were noted to have serological markers to mumps.⁸

Efficacy rates of immunity increased from a medium of 78% after receiving 1 dose to a medium of 88% after receiving the second MMR.⁹ Outbreaks of mumps since 2006 have been noted in populations where individuals had never received the mumps vaccination, received a 1-dose vaccination, or received the 2-dose vaccination.¹⁰ Recently, a third dose of the mumps vaccine has been utilized during acute outbreaks.¹¹⁻¹³ The advisory committee on immunization practices (ACIP) recommended that individuals who have previously received 2 doses of mumps vaccine but who are identified by public health as being at an increased risk of mumps due to a mumps outbreak should receive a 3rd dose of mumps vaccine to improve protection.

METHODS

This is a hospital-based prospective observational study conducted in post graduate department of pediatrics and

neonatology, G. B. Pant general hospital, an associated hospital of government medical college Srinagar. The study duration was 24 months from march 2020 to April 2022. The aims and objectives of this study was to assess clinical course, complications, outcome and role of immunization in children with mumps presenting to this tertiary care hospital.

Inclusion criteria

All children of age ≤ 18 years, both males and females with clinical diagnosis of mumps i.e., acute onset of unilateral or bilateral tender, self-limited swelling of the parotid or other salivary gland, lasting 2 or more days and without other apparent cause were included in the study.

Exclusion criteria

Children, whose parents or guardians did not agree to be a part of the study (non-consenting) were excluded.

Data collection

All children presenting to the hospital with symptoms of mumps fulfilling the inclusion and exclusion criteria were enrolled in the study. These patients were followed for clinical symptoms course and possible complications. An informed consent was taken from the parents or guardians of the patients. The ethical clearance was provided by the hospital ethical committee board.

Statistical analysis

All the collected data was recorded in Microsoft excel and analyzed using SPSS v23. Categorical variables were described as frequencies and percentages. Discrete variables were described in terms of median and interquartile range. Continuous variables were summarized as mean and standard deviation and finally, the appropriate statistical tests were applied for data analysis. Statistical significance was set at $p < 0.05$.

RESULTS

Our investigation revealed that 150 (100%) patients in our study satisfied the clinical case definition of mumps during the study period. These patients that satisfied the case definition reported with fever and predominantly bilateral parotid involvement. Fever was the most common presentation (150 patients; 100%), followed by parotid involvement. Parotitis was present in 146 (97.3 %) cases at some point during the illness, 36 patients (24 %) had unilateral, and 110 patients (73.3 %) had bilateral involvement. Sixteen percent of the subjects had multiple salivary gland involvement for a prolonged duration. The mean duration of illness was 9 ± 2 days. Constitutional symptoms like headache, myalgia or fatigue were seen in 90 patients (60%). Cough and dysphagia were seen in 83.3% and 80% of the patients respectively.

The distribution of the cases based on clinical presentation is depicted in Figure 1. It was found only 15 patients (10%) were completely immunized whereas the immunization status of 8% patients was not known, and the rest of the patients were non-immunized (82%). For statistical purposes, patients whose immunization status was not known were also considered as non-immunized. So, total of 135 (90%) patients were considered as non-immunized.

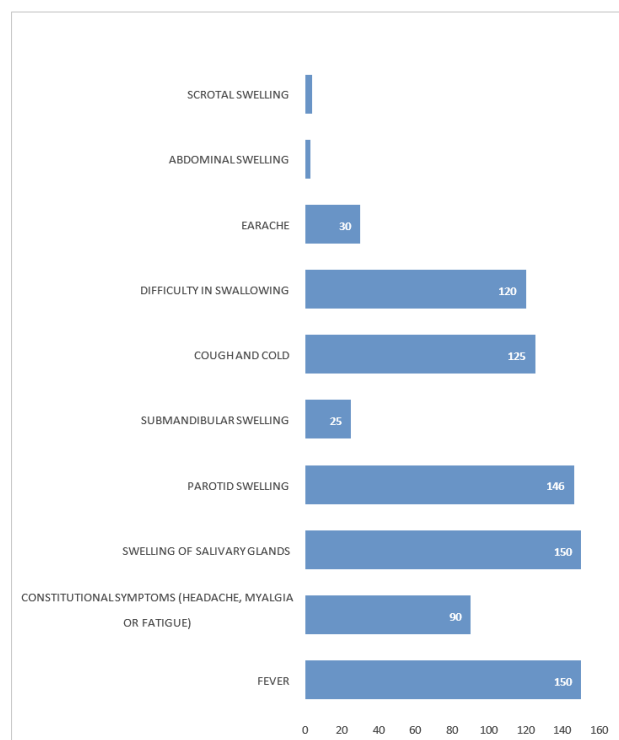


Figure 1: Clinical presentation of mumps.

Blood samples were collected from the cases and tested for the presence of mumps specific IgM antibody and IgG antibody by enzyme-linked immunoassay (EIA). Altogether, 75 (50%) patients were positive for the presence of mumps virus-specific IgM antibodies. However, only 12 (8%) were positive for IgG antibodies.

The most common complication seen was orchitis and tonsillitis, 4 cases (2.7%) each. This was followed by pancreatitis (2%), febrile seizures (2%) and meningitis (2%). The least common was myocarditis (0.7%). Only 10 (6.7%) of the patients were hospitalized and none died. Apart from serious complications, mumps in children leads to a significant loss of school days. The average loss of school days (school absentee) in our study was 8 days. All the patients were cured within 2 weeks and without any sequelae.

It is observed in this study that complications were seen only in non-immunized patients as shown in Table 1.

Table 1: Incidence of mumps cases with complications and immunization status of these children.

Complications	N	Percent (%)	Immunization status
Orchitis	4	2.7	Non-immunized
Tonsillitis	4	2.7	Non-immunized
Pancreatitis	3	2	Non-immunized
Febrile seizures	3	2	Non-immunized
Meningitis	3	2	Non-immunized
Myocarditis	1	0.7	Non-immunized

DISCUSSION

In our study, the patients reported with fever and predominantly bilateral parotid involvement. Fever was the most common presentation, followed by parotid involvement. Parotitis was present in 97.3% of cases at some point during the illness, 24 % had unilateral, and 73.3 % had bilateral involvement. Sixteen percent of the subjects had multiple salivary gland involvement for a prolonged duration. The mean duration of illness was 9 ± 2 days. Constitutional symptoms like headache, myalgia or fatigue were seen in 90 patients (60%). Cough and dysphagia were seen in 83.3% and 80% of the patients respectively. Our findings were similar to studies done by Arshad et al, Paul et al and Moghe et al.¹⁴⁻¹⁶ The study by Indranil et al reported bilateral parotid-swelling in 92.3% of cases, among the general symptoms fever was the most common presentation, reportedly present in 92.3% of study subjects.¹⁷ The overall mean duration of parotid swelling was calculated to be 6.85 ± 1.89 days with 6.73 ± 1.95 days and 6.95 ± 1.86 days for the male and female, respectively, which was similar to our study.

We found the parotid swelling and earache settled in a week's time which is in concordance to other studies like Gut et al, Rima et al, Kanra et al and Gustavo et al.¹⁸⁻²¹ In our study, 50% of patients were positive for the presence of mumps virus-specific IgM antibodies. However, only 8% were positive for IgG antibodies. Detection of mumps-specific IgM antibody in serum or saliva is a good diagnostic measure in unvaccinated patients. Timing of specimen collection is important to consider in interpreting laboratory results. Negative IgM ELISA results may occur when the serum is collected prior to day four of clinical presentation. By contrast, patients who mount a secondary immune response, as occurs in the majority of vaccinated mumps cases, may not have IgM response, or it may be transient and not detected depending on the timing of specimen collection. Therefore, a high number of false-negative results may occur in previously vaccinated individuals, and the absence of anti-mumps IgM response in a vaccinated or previously infected individual presenting with clinically compatible mumps does not rule out mumps as a diagnosis.

In our study, the most common complication seen was orchitis and tonsillitis. The least common was myocarditis.

(0.7%). All the patients were cured within 2 weeks and without any sequels, which was similar to Variel et al.²²

Apart from serious complications, it leads to a significant loss of school days. The average loss of school days (school absentee) in our study was 8 days, which was consistent with Indranil et al.¹⁷ School and sickness absenteeism were partly due to the sufferings caused by the disease and partly due to the advice given to them to take rest from their school or workplace until the parotid swelling subsided intending to restrict the spread of the infection.

Only 6.7% of the patients were hospitalized. The main complication registered in this study in hospitalized mumps cases was meningitis, which was similar to López-Perea et al and in contrast with Takla et al which showed orchitis as the most prevalent complication.^{23,24}

In our study, no one suffered from oophoritis and no one died, which was similar to Moghe et al, who reported no case of oophoritis and no deaths in his study.¹⁶ Similarly study by Indranil et al all-affected persons recovered fully without any severe complications and death.¹⁷

It is observed in our study that complications were seen only in non- immunized patients. Mumps vaccination is a proven way of preventing infection with the virus, reducing the severity of disease if contracted, and reducing transmission. Two doses of vaccine are 88% effective at protecting against mumps and 1 dose is 78% effective.²⁵

Limitations

There was potentially recall bias regarding the date of illness onset and short follow up period.

CONCLUSION

Vaccination is recognized as the best way to prevent mumps. Given the existence of the MMR vaccination which is used in many countries globally, we suggest that the benefits of ensuring vaccination against mumps in addition to rubella and measles would be a logical public health intervention that would have highly significant clinical and economic benefits. By presenting data collected from the Kashmir region, we add to the body of literature supporting the inclusion of the mumps vaccination in the UIP on the basis that it is a significant public health problem.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Mir NY, Wani JN, Farooq W, Zaman BU. Clinical course, complications, immunization status and outcome of mumps in children. *Int J Community Med Public Health* 2023;10:1076-80.