INTRAMUSCULAR INJECTION AS A PROVOCATIVE FACTOR IN PARALYTIC POLIOMYELITIS

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Acute paralytic poliomyelitis is still prevalent inspite of large scale immunization programmes being carried out throughout the country. One of the important factors incriminated to provoke paralysis is administration of intramuscular (IM) injections especially, when the child has had exposure to poliovirus(l). IM injections are commonly prescribed in cases of fever(2). The relationship of parenteral injections with paralytic poliomyelitis has been reported by various workers from India and abroad(l-4). The present study was conducted to ascertain the role of drugs given by IM injection in the development of paralytic poliomyelitis.

Material and Methods

Seventy four cases of acute poliomyelitis with the history of IM injection preceding paralysis during November 1991 to February 1993 were included in this study. Out of these, 50 cases were taken from the Department of Pediatrics, G.S.V.M. Medical College, Kanpur and 24 cases were taken from a pediatric clinic at Farrukhabad. The case was defined as suffering from acute poliomyelitis if the child had acute asymmetric flaccid paralysis of lower motor neurone type without objective sensory disturbances following a short episode of fever(5). Bulbar polio cases were those who had involvement of the 9th, 10th and 11th cranial nerves manifested as difficulties in phonation (feeble cry), deglutition and regurgitation of ingested food material(5). Children who had received one or two primary doses of oral polio vaccine (OPV) were considered partially immunized and those who had received 3 doses of OPV as fully immunized. Those children more than \Vi years of age who had received three doses of primary immunization plus one booster were also considered as fully immunized for that age (6). Protein energy malnutrition classification was graded according to the Nutrition Subcommittee of Indian Academy of Pediatrics(7).

A detailed history of immunization and IM injection was recorded in a pretested proforma. Name of drug was ascertained and confirmed when the prescription was available. IM injections received within one month prior to onset of paralysis or illness was considered to be a risk factor(2). Statistical analysis was performed using the X^2 test.

Results

Of the 74 cases there were 40 boys and 25 (33.8%) girls. The youngest patient was 3 months old and the eldest was $6^{1/2}$ years

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of age. Fifty eight (78.4%) cases were upto 3 years of age, and 5 (6.8%) cases were under 6 months of age, 18 (24.3%) cases were more than three years of age. Eighteen (24.3%) were fully immunized with oral polio vaccine (OPV), while 12 (16.2%) were partially immunized and 44 (59.5%) were unimmunized. Sixty nine (93.2%) cases were seen during the months of May to September and none were seen in the months of November to January. The nutritional status was normal nutrition in 37 cases, malnutrition Grade I in 22, Grade II in 11 and Grade III in 4 cases.

Sixty nine cases were of acute spinal type, while 5 cases of bulbospinal type. One limb, two limbs, three limbs and four limbs involvement was seen in 35 (47.3%), 32 (43.2%), 2 (2.7%) and 5 (6.7%) cases, respectively. Lower limbs involvement was noted in 63 (85.1%) cases as compared to upper limb involvement in 11 (14.9%) cases. In 55 (74.3%) cases, the same injected limb was involved, whereas in 19 (25.7%) cases more limbs including the injected limb was involved. Only in 2 (2.7%) cases injected upper limb developed paralysis. The comparison was done between the immunized and unimmunized cases having limb involvement. A highly significant difference was found between them ($p<0.001$). Sixty eight cases developed paralysis during the first six days after the administration of IM injections, 5 cases between 7-14 days and only one case after 15 days.

In 47 (63.5%) cases, drugs administered by IM route were identified. Drugs administered included antibiotics—tetracyclines, gentamicin sulphate, chloramphenicol and cefotaxime sodium, in 22 (46.8%), antipyretics—paracetamol and analgin in 8 (17.0%), steroids in 8 (17.0%), DPT vaccine in 4 (8.5%), vitamins in 3 (6.3%), chloroquine in 1 (2.1%) and placentrax (aqueous solution of human placental extract) in 1 (2.1%) cases. In 27 (36.5%) cases, the drug administered by IM route could not be identified.

Discussion

Risk of paralysis has been reported with intramuscular injection given at any time within one month earlier to onset of illness(2,4). Our findings confirm this. Provocative poliomyelitis was first recognized in 1950 after mass use of DPT vaccine in UK and Australia(3). In a community hyperendemic with poliomyelitis, even DPT injections may provoke the paralysis. In 4 cases, paralytic poliomyelitis developed following DPT vaccination in the same limb in the present study, which was also reported by Srivastava *et al.(8)*.

No deleterious effect was observed as compared to other drugs in the present study with cortisone, though this drug may increase the severity of the certain form of experimental poliomyelitis(9). No single drug was particularly responsible for the development of paralytic attack in the present study. It has been reported that provocative factors like trauma, IM injections and tonsillectomy cause hyperemia of a particular segment of spinal cord, thus increasing the concentration of virus in the spinal cord. These also disturb the blood brain barrier and enhance the possibility of paralytic poliomyelitis(9).

In the present study the "risk period" was high during first 6 days after administration of IM injection. Longer durations varying from 7 days upto 1 month have been reported by Deivanayagam *et al.(2)*. A child who receives IM injection during the "risk period" is reported to be 1.5 to 16.8 times at risk to develop paralysis(2,3).

The risk for developing paralysis after IM injection was less in the immunized children (24.3%) as compared to unimmunized children (59.5%) in the present study, in contrast to the findings of other workers who reported that the risk for developing paralysis was the same irrespective of the child's immunization status for OPV(2). Lower limbs involvement alone or with upper limbs was seen in 97.3% cases in the present study indicating predilection of lower limbs as compared to upper limbs (2.7%) after intramuscular injections. Deivanayagam, *et al.* had reported lower limb involvement in 97.7% cases among both who received and who did not receive injections(2). Predilection of lower limbs in cases of polio could be due to trauma during walking and running, due to fall and by IM injections which are routinely given in the buttocks and rarely in the arm. In 97.3% cases in the present study and in 38.8% cases in the study of Deivanayagam and coworkers, the limb injected and limb paralysed was the same lower limb. It was reported that children who had received multiple injections were twice at risk to develop paralysis compared to those who had received single injection(4) which was not seen in the study of other workers(2).

Our findings suggest that IM injections are important provocative factors for the development of paralysis in cases of acute poliomyelitis. All types of drugs including antibiotics, antipyretics, steroids, vitamins and DPT vaccine are implicated. IM injections must be avoided, particularly during summer months (May to September), and, if required, in serious cases the drugs should be given by intravenous route.

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