

# Rota virus vaccine-induced intussusception: A case report study

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## Abstract

**Introduction:** Intussusception is a rare potential adverse effect of oral rotavirus vaccination, estimated to occur in approximately 1:100,000 vaccine recipients.

**Case presentation:** Six-months old boy presented with vomiting for 3 days, colicky abdominal pain, and did not pass stool for one day prior to the admission. Passage of a reddish soft jelly like motion was reported by his mother. No seizure, no cough, no jaundice, no skin/joint/ bone complications. History of similar condition 2 months ago at age of 4 months (one week following his scheduled vaccination which contains Rota vaccine). Physical examination; lethargic, afebrile with stable vital signs, abdomen was soft, lax with no distension or palpable mass. Per rectal (PR) examination was blood stained. He was diagnosed with intussusception. Hydrostatic reduction was failed. Laparotomy resection of 6 CM of terminal ileum 15CM away from ileocaecal valve with appendectomy. Patient underwent uneventful postoperative course and discharged in good condition.

**Conclusion:** Although the reported vaccine-induced intussusception occurs every now and then, the overall risk benefit balance of vaccines remains positive So World Health Organization (WHO) and the Australian Technical Advisory Group on Immunization (ATAGI) have recommended the continued use of rotavirus vaccine for infants as it reduces annual hospital admissions in children under 5 years due to rotavirus gastroenteritis.

**Key words:** Intussusception, Rota virus, Vaccination

## Introduction

Rotavirus is the leading cause of severe diarrhea in infants and children worldwide, leading to more than half a million deaths each year in children under the age of five years. The first rotavirus vaccine, Rotashield, was introduced in 1999. It was voluntarily withdrawn from the market within a year because post-marketing surveillance found 1-2 excess cases of intussusception per 10,000 recipients [1]. Two newer vaccines, Rotateq and Rotarix, were thought not to carry that risk, but two new trials have shown that they do. Still, the risk is small and the benefits of the vaccines are great. Newer vaccines, Rotateq and Rotarix, were licensed only after testing (in over 60,000 infants for each) failed to find any association with intussusception [2]. Those trials were designed to have enough statistical power to detect a risk similar to that of RotaShield. Both new vaccines contain live, attenuated strains of the virus and are given orally. Rotateq is a pentavalent (prepared from 5 strains) vaccine given in 3 doses at age 2, 4, and 6 months. Rotarix is monovalent (prepared from 1 strain) and is given in 2 doses at age 2 and 4 months. Either is recommended, but about 10 times more doses of the pentavalent vaccine have been administered. After the new vaccines came into common use, studies in other countries pointed to a small increase in intussusception with the newer vaccines, but still at a much lower rate than with Rotashield[3].

Intussusceptions after administration of Rota vaccine is a very rare serious complication that could be easily missed. Intussusception is a "telescoping" of the intestine where one section slides inside another section. This can cut off the blood supply, block the intestine, and cause tears, infections, and death. Most cases are in young children [4]. The baseline incidence of intussusception in children is 1-4 per 1,000. Most cases have no identified cause, but the most plausible candidate is hypertrophied lymphoid tissue resulting from viral illnesses, especially rotavirus infections. They have severe abdominal pain (intermittent at first), and pass blood in the stool, typically mixed with mucus and having the appearance of currant jelly [5]. A barium enema can confirm the diagnosis and simultaneously treat it. Sometimes surgery is needed[6].

## Case presentation

Six months old boy presented to emergency room complaining of vomiting for 3 days, colicky abdominal pain, and he did not pass stool for 1 day prior to the admission. The patient developed fever and decreased feeding. He developed vomiting of large amount of undigested food, non-bilious passage of reddish soft jelly like motion as reported by the mother. He suffered from decreased activities. No seizure, no cough, no jaundice, no skin/joint/bone complication. History of similar condition 2 months ago at the age of 4 months (one week following his scheduled vaccination which contains Rota vaccine). On physical examination he looks lethargic afebrile with stable vital signs, abdomen was soft, lax, not distended with no palpable mass. Per rectal (PR) examination was blood stained.

## Investigations

**Complete blood picture** showed : Hemoglobin 11.3g/dl, White Blood Cell count 21.5/cc, Platelet count 367/cc

**Chemistry and coagulation profile** results were within normal.

**Radiology;** A-P erect X-ray film showed dilated bowel loops.

**Abdominal ultrasound (U/S)** showed intussusception with minimal free fluid.

## Management

Hydrostatic reduction was done initially and confirmed by contrast enema. After 12 hours, he developed vomiting and redcurrant jelly stool. Repeated abdomen ultrasound showed ileo-ileal intussusception with failed hydrostatic reduction. Laparotomy proceeded and revealed ileo-ileal intussusception with intraluminal polyp. Resection of 6 Cm of terminal ileum 15Cm away from ileocaecal valve with appendectomy was carried out. The patient underwent uneventful postoperative course and was discharged in good condition.

## Discussion

### Risk with RRV-TV:

In 1999, just over a year after human-rhesus rotavirus reassortant vaccine (RRV-TV, RotaShield) was licensed, it was withdrawn from the market because of an epidemiologic link to intussusception[4]. The increased risk was estimated to be approximately 22-fold over the background risk within five to seven days of vaccination and overall approximately one excess case for every 10,000 to 12,000 vaccinated infants [5,6]. The mechanism of this association is unclear. One hypothesis is that; vaccination triggered intussusception in infants who were likely to develop intussusception with any enteric infection, based upon the observation that rates of intussusception were actually lower among vaccine recipients than non-vaccinees in the period of 4 to 12 weeks after vaccination [7]. Thus, RRV-TV may have caused intussusception in infants who otherwise would not have experienced intussusception, but it also may have protected against natural rotavirus infection-induced intussusception in others.

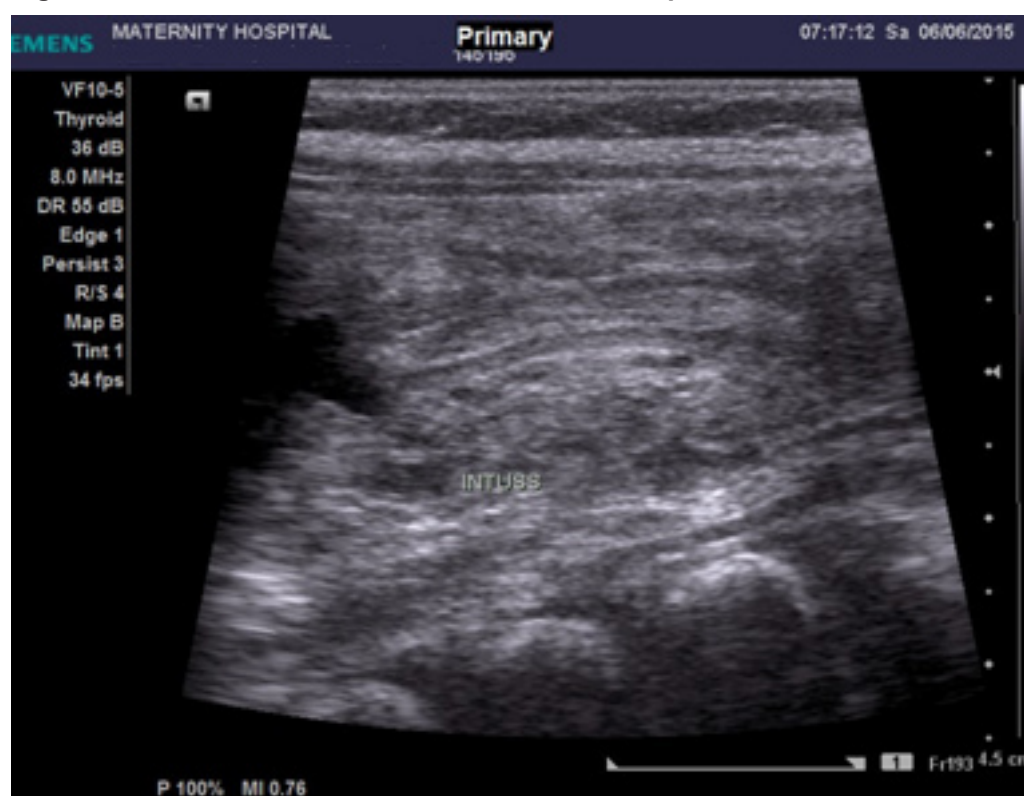
### Risk with RV5 and RV1:

Intussusception is a rare potential adverse effect of oral rotavirus vaccination, estimated to occur in approximately 1 in 20,000 to 1 in 100,000 vaccine recipients [8-13]. A history of intussusception is a contraindication to rotavirus vaccination [14,15], but for infants without a history of intussusception, the risk of intussusception after rotavirus vaccination is much lower than the risk of severe rotavirus gastroenteritis in children who do not receive rotavirus vaccine [16-18].

Figure 1: A-P erect X-Ray film showed: Dilated bowel loops



Figure 2: Abdominal ultrasound showed intussusception with minimal free



Parents should contact their child's healthcare provider if the child develops signs of intussusception (ie, stomach pain, vomiting, diarrhea, blood in the stool, or change in bowel habits) at any time after vaccination, especially within the first 14 days after a dose was given.

Pre-licensure studies of pentavalent human-bovine rotavirus reassortant vaccine (RV5) and attenuated human rotavirus vaccine (RV1), found no increased risk of intussusception among vaccine recipients compared with placebo recipients [19,20], however, post-licensure studies conducted by the Centers for Disease Control and Prevention (CDC), the Vaccine Safety Data link investigation group, the US Food and Drug Administration (Post-licensure Rapid Immunization Safety Monitoring), vaccine manufacturers, and others suggest a rare association between RV5 and RV1 vaccination and intussusception within 21 days of the first dose [8-13,21]. The absolute number of estimated rotavirus hospitalizations prevented by rotavirus vaccines far exceeds that of cases of intussusception associated with rotavirus vaccine (eg, 65,000 hospitalizations prevented and 40 to 120 cases of intussusception per year in the United States) [16]. The CDC continues to recommend universal rotavirus vaccination for infants in the United States.

## Conclusion

A rotavirus vaccine (either one) is recommended by the CDC, the American Pediatric Association, and other professional groups as a part of the routine immunization schedule in the United States. Parents should be informed of the signs of intussusception and should monitor their infants especially in the first 7 days after vaccination; and since intussusception can recur, caution is advised in children who have a history of intussusception. A rotavirus vaccine (either one) is recommended by the CDC, the American Pediatric Association, and other professional groups as part of the routine immunization schedule in the United States. Parents should be informed of the signs of intussusception and should monitor their infants especially in the first 7 days after vaccination; and since intussusception can recur, caution is advised in children who have a history of intussusception.

## References

- 1- Peter G, Myers MG, National Vaccine Advisory Committee, National Vaccine Program Office. Intussusception, rotavirus, and oral vaccines: summary of a workshop. *Pediatrics*. 2002;110(6):e67.
- 2- Centers for Disease Control and Prevention (CDC). Intussusception among recipients of rotavirus vaccine--United States, 1998-1999. *MMWR Morb Mortal Wkly Rep*. 1999;48(27):577.
- 3- Murphy TV, Gargiullo PM, Massoudi MS, Nelson DB, JumaanAO, Okoro CA, Zanardi LR, Setia S, Fair E, LeBaron CW, Wharton M, Livengood JR, Rotavirus Intussusception Investigation Team. Intussusception among infants given an oral rotavirus vaccine. *N Engl J Med*. 2001;344(8):564.
- 4- Murphy BR, Morens DM, Simonsen L, Chanock RM, La Montagne JR, Kapikian AZ. Reappraisal of the association of intussusception with the licensed live rotavirus vaccine challenges initial conclusions. *J Infect Dis*. 2003;187(8):1301.
- 5- Clark A, Jit M, Andrews N, Atchison C, Edmunds WJ, Sanderson C. Evaluating the potential risks and benefits of infant rotavirus vaccination in England. *Vaccine* 2014 Jun 17;32(29):3604-10. doi: 10.1016/j.vaccine.2014.04.082. Epub 2014 May 9.
- 6- Glass RI, Parashar UD. Rotavirus vaccines--balancing intussusception risks and health benefits. *N Engl J Med*. 2014;370(6):568.
- 7- Murphy BR, Morens DM, Simonsen L, Chanock RM, La Montagne JR, Kapikian AZ. Reappraisal of the association of intussusception with the licensed live rotavirus vaccine challenges initial conclusions. *J Infect Dis*. 2003;187(8):1301.
- 8- Anderson EJ, Shippee DB, Weinrobe MH, Davila MD, Katz BZ, Reddy S, Cuyugan MG, Lee SY, Simons YM, Yogeve R, Noskin GA. Indirect protection of adults from rotavirus by pediatric rotavirus vaccination. *Clin Infect Dis*. 2013;56(6):755.
- 9- Gastañaduy PA, Curns AT, Parashar UD, Lopman BA. Gastroenteritis hospitalizations in older children and adults in the United States before and after implementation of infant rotavirus vaccination. *JAMA*. 2013 Aug;310(8):851-3.
- 10- Cortese MM, Dahl RM, Curns AT, Parashar UD. Protection against gastroenteritis in US households with children who received rotavirus vaccine. *J Infect Dis*. 2015;211(4):558.
- 11- Mast TC, Wang FT, Su S, Seeger JD. Evidence of herd immunity and sustained impact of rotavirus vaccination on the reduction of rotavirus-related medical encounters among infants from 2006 through 2011 in the United States. *Pediatr Infect Dis J*. 2015;34(6):615.
- 12- Patel MM, López-Collada VR, Bulhões MM, De Oliveira LH, Bautista Márquez A, Flannery B, et.al., Intussusception risk and health benefits of rotavirus vaccination in Mexico and Brazil. *N Engl J Med*. 2011;364(24):2283.
- 13- Velázquez FR, Colindres RE, Grajales C, Hernández MT, Mercadillo MG, Torres FJ, Cervantes-Apolinar M, DeAntonio-Suarez R, Ortega-Barria E, Blum M, Breuer T, Verstraeten T. Postmarketing surveillance of intussusception following mass introduction of the attenuated human rotavirus vaccine in Mexico. *Pediatr Infect Dis J*. 2012;31(7):736.
- 14- Centers for Disease Control and Prevention (CDC). Addition of history of intussusception as a contraindication for rotavirus vaccination. *MMWR Morb Mortal Wkly Rep*. 2011;60(41):1427.
- 15- Haber P, Patel M, Pan Y, Baggs J, Haber M, Museru O, Yue X, Lewis P, Destefano F, Parashar UD. Intussusception after rotavirus vaccines reported to US VAERS, 2006-2012. *Pediatrics*. 2013 Jun;131(6):1042-9. Epub 2013 May 13.
- 16- Carlin JB, Macartney KK, Lee KJ, Quinn HE, Buttery J, Lopert R, Bines J, McIntyre PB. Intussusception risk and disease prevention associated with rotavirus vaccines in Australia's National Immunization Program. *Clin Infect Dis*. 2013;57(10):1427.



- 17- Weintraub ES, Baggs J, Duffy J, Vellozzi C, Belongia EA, Irving S, Klein NP, Glanz JM, Jacobsen SJ, Naleway A, Jackson LA, DeStefano F. Risk of intussusception after monovalent rotavirus vaccination. *N Engl J Med.* 2014;370(6):513.
- 18- Yih WK, Lieu TA, Kulldorff M, Martin D, McMahonill-Walraven CN, Platt R, Selvam N, Selvan M, Lee GM, Nguyen M. Intussusception risk after rotavirus vaccination in U.S. infants. *N Engl J Med.* 2014;370(6):503.
- 19- Vesikari T, Matson DO, Dennehy P, Van Damme P, Santosham M, Rodriguez Z, Dallas MJ, Heyse JF, Goveia MG, Black SB, Shinefield HR, Christie CD, Ylitalo S, Itzler RF, Coia ML, Onorato MT, Adeyi BA, Marshall GS, Gothefors L, Campens D, Karvonen A, Watt JP, O'Brien KL, DiNubile MJ, Clark HF, Boslego JW, Offit PA, Heaton PM, Rotavirus Efficacy and Safety Trial (REST) Study Team. Safety and efficacy of a pentavalent human-bovine (WC3) reassortant rotavirus vaccine. *N Engl J Med.* 2006;354(1):23.
- 20- Ruiz-Palacios GM, Pérez-Schael I, Velázquez FR, Abate H, Breuer T, Clemens SC, et al., Human Rotavirus Vaccine Study Group. Safety and efficacy of an attenuated vaccine against severe rotavirus gastroenteritis. *N Engl J Med.* 2006;354(1):11.
- 21- Desai R, Cortese MM, Meltzer MI, Shankar M, Tate JE, Yen C, Patel MM, Parashar UD. Potential intussusception risk versus benefits of rotavirus vaccination in the United States. *Pediatr Infect Dis J.* 2013 Jan;32(1):1-7.