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CASE REPORT

Adverse Drug Reaction to Paracetamol: Case Report of Oral Manifestation of Stevens-Johnson Syndrome in Children

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Introduction: A rare but serious immunologically driven adverse medication reaction is known as Stevens-Johnson Syndrome (SJS). Although paracetamol is commonly used as an analgesic and antipyretic and is thought to be safe, it can occasionally cause serious hypersensitivity reactions, including SJS. This case study details a young kid who experienced severe oral symptoms of SJS after being exposed to paracetamol.

Case(s) Presentation: A 13-year-old girl complained of redness, particularly around her mouth and feet. When the upper and lower lips were examined extraoral, there was significant bleeding along with swelling and hemorrhagic crusts. The case has been diagnosed with SJS e.c. based on the physical examination, clinical examination and medical history. Susp. Paracetamol. The patient received treatment with 25 mg of Vaseline applied topically, 0.9% NaCl, 0.1% Minosep, and 0.1% mometasone furoate. The patient recovered without any complaints following 21 days of treatment.

Discussion: One of the most used medications, paracetamol, has some adverse effects, including SJS. Granule-mediated exocytosis, drug-specific CD8+ cytotoxic lymphocytes, the FasL pathway, and TNF-alpha are four primary pathophysiological pathways that account for drug responses. These mechanisms are involved in apoptotic processes that lead to significant mucosal erosion and ulceration, as well as tissue damage and inflammation in the oral mucosa.

Conclusion: Paracetamol, while commonly considered safe for children, can seldom induce severe delayed-type hypersensitivity events, including Stevens-Johnson syndrome (SJS). This instance illustrates that pediatric patients continue to be susceptible to drug-induced hypersensitivity, even with frequently administered drugs. Clinicians must remain alert for initial indications of hypersensitivity responses.

Keywords: adverse drug reaction, SJS, paracetamol

Introduction

The World Health Organisation (WHO) characterises an Adverse Drug Reaction (ADR) as "a detrimental, unintended response to a medication that occurs at doses commonly used in humans for disease prevention, diagnosis, or treatment, or for the modification of physiological function".

Approximately 20% of the population in the UK comprises children, although they utilise merely 5% of all prescribed medications. A Canadian study revealed that the distribution of prescribed medications among children was uneven, with 25% of children obtaining over 70% of their prescriptions.[1]

Allergists categorise ADR into type A and type B.[2] Type A is typically dose-dependent. This reaction results from the drug's pharmacological mechanism. Type B reactions are not dose-dependent; they primarily consist of hypersensitivity reactions to the medication.[3] The principal ADR associated with paracetamol is the hepatotoxic effect of the non-primary cytochrome pathway metabolite N-Acetyl-P-Benzoquinone Imine (NAPQI). Type B ADR, characterised by hypersensitivity, may manifest through various symptoms, particularly localised oedema and associated dermal tissue and mucosal reactions.[4]

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Although adverse responses to paracetamol are infrequent, they can occasionally result in life-threatening illnesses.[5] Although most people consider paracetamol to be a safe antipyretic, it can occasionally result in serious immunologically mediated adverse drug reactions (ADRs). One of the most dangerous types of delayed hypersensitivity adverse drug reactions is Stevens-Johnson Syndrome (SJS). The reaction is usually brought on by exposure to an offending medication, though some genetic predispositions (such as particular HLA alleles) may increase sensitivity. Therefore, rather than being a straightforward adverse impact, SJS is best described as a drug-induced hypersensitivity reaction. Most people agree that paracetamol is a safe antipyretic and analgesic, especially for kids, and that SJS and other hypersensitivity reactions are rare. This hypersensitivity reaction is known to result from regulatory dysfunction in cellular immunity.[6] Drug eruptions due to the use of these drugs remain a major challenge in treatment.[7] Emphasizes the importance of early diagnosis and multidisciplinary management to reduce morbidity and mortality.

An antipyretic which is commonly used is Paracetamol, which is used to relieve fever and associated discomfort in children due to its affordability and easy availability. Prospective cohort research indicated that up to 95% of children were exposed to paracetamol by 9 months of age.[8]

Paracetamol has known and potentially serious side effects, especially if used inappropriately. Paracetamol undergoes metabolism via glucuronidation and sulfation in the liver. Approximately 5 to 10% of the medication is metabolised by Cytochrome P450 (CYP450) into a hazardous substance, N-acetyl-p-benzoquinoneimine, which causes hepatocellular injury. The most serious side effect associated with giving paracetamol to children is hepatotoxicity, although urticaria and maculopapular eruptions can also occur in this demographic.[9]

This paper aims to provide a comprehensive understanding of ADR with a highlight on the oral manifestations linked to paracetamol use in children. It highlights the classification of ADR, hypersensitivity reactions (Type B), which may present with oral symptoms such as mucosal edema, ulcerations, and erythema. Additionally, the paper discusses severe hypersensitivity reactions, such as SJS which often involves oral mucosa and can lead to significant morbidity. By examining the impact of paracetamol hypersensitivity on oral tissues, this study seeks to raise awareness among healthcare professionals regarding the early recognition, risks, and safe administration of this widely used medication in pediatric patients.

Case Presentation

A 13-year-old female patient has been treated at the Hospital since September 17, 2024, with complaints of difficulty opening her eyes, as well as redness, especially in the mouth and foot area. The patient also complained of body pain after taking paracetamol a day before. The patient has never experienced this condition before. The patient has not been able to open her mouth wide (Figure 1). The patient has no prior systemic disease and denies any familial history of sickness. The patient utilises nasogastric tube help for nutritional intake. The dental examination could not be conducted effectively due to the patient's difficulty in opening his mouth.

Clinical Finding

The intraoral examination cannot be carried out optimally because the patient had pain when opening her mouth. The eye area shows palpebral edema and excoriation accompanied by lesions with blackish crusts. Macular erythema is also seen on the hands and feet. There are extensive haemorrhagic crusts on the enlarged upper and lower lips, accompanied by quite a lot of bleeding. Risk of dehydration due to feeding difficulty. Severe pain interfering with eating, speaking, and mouth opening. The patient used NGT for eating.

Currently, the patient's condition is weak, with an overall state of Compos Mentis. The blood pressure is 110/70. 81 times each minute, 20 breaths per minute is the respiratory rate. 98% oxygen saturation. Temperature: 36.6 degrees Celsius. Extraoral examination of the face, macular erythema, purpura, and crust lesions.

Laboratory examination results obtained high platelet results with a value of 508 10^3/uL (with a reference normal value of 150 10^3/uL - 450 10^3/uL), and high neutrophil values of 73% (with a reference normal value of 50–70%). Other values are normal (Table 1). A thorough lab evaluation, which would have included tests for liver enzymes and kidney function or another allergy test to confirm the diagnosis, was not done because of money constraints and limited access. Based on clinical examination, medical history, and physical examination, the diagnosis of this case is SJS e.c. Susp. Paracetamol. The prognosis of these cases is ad bonam.

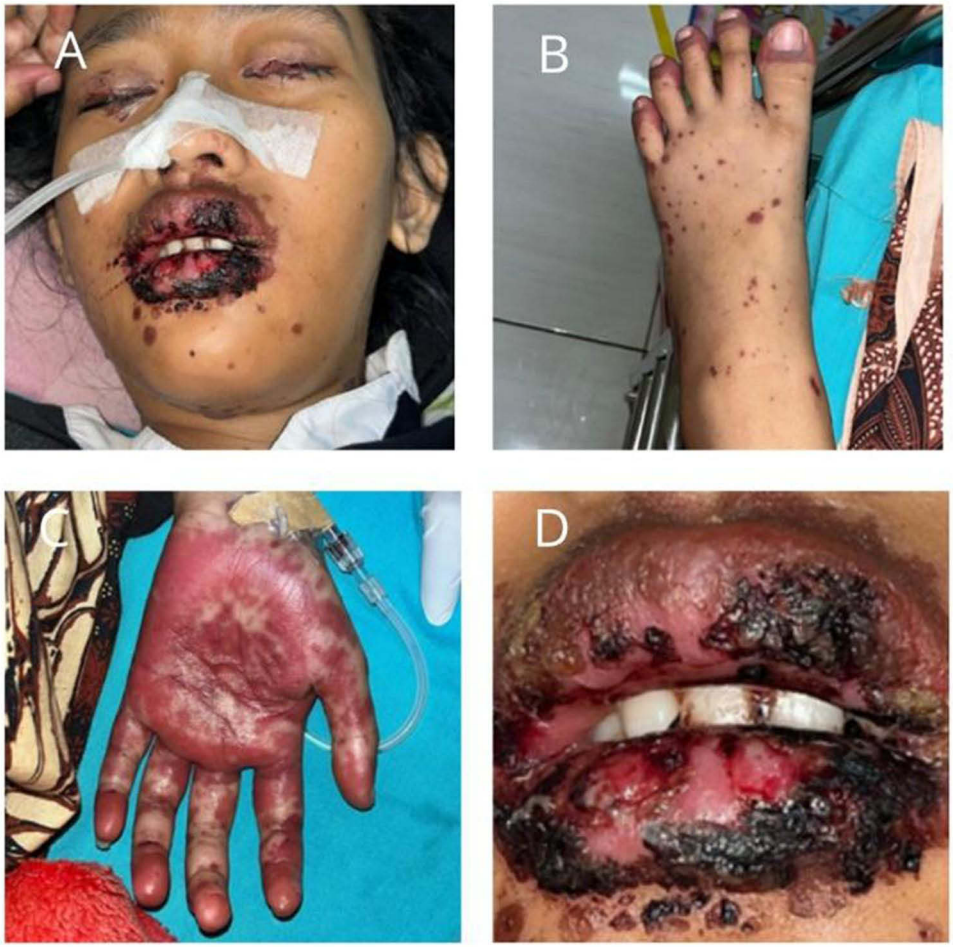

Figure 1 Clinical picture on September 20, 2024 (1st visit). (**A**) Black Crust and erosive lesions on the lips. (**B**) Macular erythema in the feet. (**C**) Macular erythema in the palmar hand. (**D**) Up close, black and erosive lesion on the lips. Based on primary data collected by the author (2024).

Case Management

This patient was given non-pharmacological and pharmacological treatments. Non-pharmacological treatment involves educating the patient about their condition, including its causes and the potential effects that will occur if the condition continues. It also explains how to clean teeth by brushing twice a day. The patient was treated with 0.9% NaCl to compress the lips, and Minosep 0.1% mouthwash (10 mL) was administered twice a day, with a 1-minute gargle,

Table 1 Complete Blood Count Laboratory Test Results

Parameter	Result	Normal Range
Hemoglobin	13.3 g/dL	12-16 g/dl
Hematocrit	41.9%	35 – 45%
Eritrosit	5.62 10^3/uL	4.0–5,5 10^6/ul
Leukocyte	9.9 10^3/uL	7 – 17 10^3/ ul
Thrombocyte	508 10^3/uL (H)	150 –450 10^3/ul
Neutrophil	73% (H)	50 –70%

(*Continued*)

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Table 1 (Continued).

Parameter	Result	Normal Range
Limfosit	18%	20 −40%
Monocyte	8%	2 −8%
Eosinophil	1%	1 – 3%
Basophil	0%	0 −1%
Random blood sugar	89 mg/dl	70 – 200 mg/dl

Abbreviations: mg, milligram; L, Low; H, High; fL, femtoliters; µL, microliter; U/L, Units per Liter; dL, deciliter.

followed by spitting out the solution. Mometasone furoate 0.1% was applied to the erosion lesion area, and Vaseline was used for perioral application. The patient was also treated under the supervision of a dermatologist and a venereologist. Also, given Ranitidine 2×50 mg IV, Dexamethasone 15 - 0 - 15, and Cetirizine 1×10 mg. Topical drugs used were Desoximetasone 2x/day and Gentamycin 2x/day. Cetirizine was used solely for the alleviation of pruritus and allergic manifestations, provided under the oversight of a Dermato-Venereology specialist. We have elucidated this in the Discussion to prevent misinterpretation, as cetirizine does not alter the delayed-type hypersensitivity mechanism of SJS.

The patient made four visits, consisting of one initial visit and three follow-up visits for control. At the second visit, the crust on the lips was still there, but after the third visit for control, the patient's lips experienced significant improvement, as shown in Figure 2. The patient has been discharged from the hospital after a one-week hospitalization. Patients often struggle to return to the hospital for final check-ups due to financial constraints. After 21 days of treatment, the patient recovered without any complaints.

Discussion

This case reports a highlight of an uncommon but severe hypersensitivity reaction to paracetamol in a pediatric patient. Highlighting the significance of prompt identification and interdisciplinary management of SJS. However, this report has limitations. The absence of confirmatory allergy testing limits the definitive attribution of causality to paracetamol due to financial problems for the patient.

The patient is categorised as paediatric due to being 13 years old. The incidence is 7.5 cases per 100,000, with a higher prevalence observed in children. The incidence rate of SJS is 38.4 per 100,000 individuals in between the ages

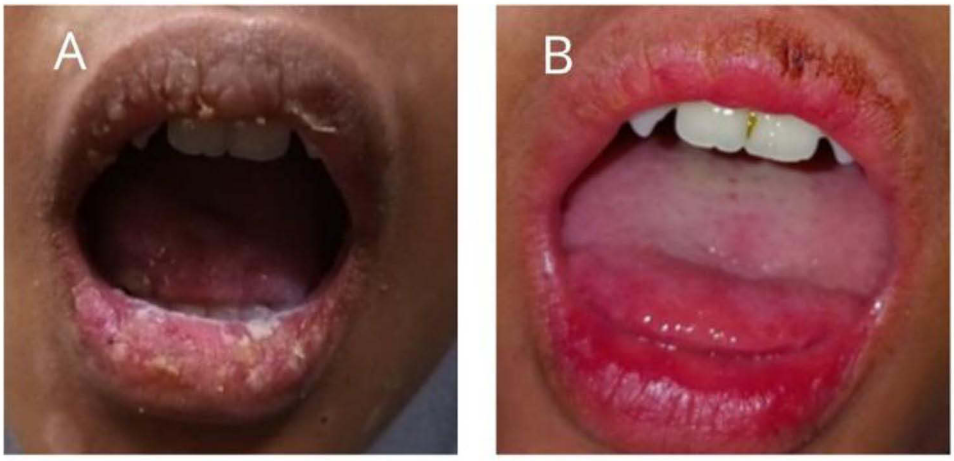

Figure 2 Clinical Picture of the Lips. (**A**) Visit 3/2nd control. Showing persistent crust on the lips. (**B**) Visit 4/3rd control. Showing marked improvement of the lips.Based on primary data collected by the author (2024).

of eleven and fifteen. Individuals aged 11–15 years undergo significant hormonal and immunological changes during puberty.[10] An estimated 1–2 incidences of SJS occur annually per million people in the general population. Although they vary greatly, children's mortality rates are lower than those of adults. For example, the mortality rate from SJS is 3.6% in children.[11] Children's immune systems are active and undergo quick changes during puberty.[12] When taken as directed, paracetamol, one of the most widely used antipyretics and pain medications, has little to no side effects. The WHO encourages for the administration of paracetamol in children with body temperatures over 38.5°C due to its established efficacy as a paediatric medicine.[13]

Health care providers can misdiagnose allergies due to early symptoms that mimic those of other illnesses. SJS is a severe and potentially fatal dermatological disease that can affect skin and mucosa, including oral mucosa. Stopping the progression of SJS requires early diagnosis and therapy.[14] SJS symptoms can show up 4–28 days after drug exposure, with a prodromal phase that usually lasts up to 1 week and occurs 1–2 days before the rash. Along with typical flu-like symptoms, including sore throat, cough, dry eyes, myalgias, and arthralgias, these symptoms also include anorexia, fever, and malaise.[15] After this period, erythematous macular papular lesions with an irregular shape that resemble morbilliform, urticarial, purpuric, or targetoid skin rashes emerge symmetrically and abruptly. Over the course of three to twelve days, the lesions, which often begin on the trunk, rapidly spread to the face, neck, limbs, palms, and soles. The maculopapular lesions turn purplish or blackish, tend to blister quickly, group together as target lesions, and burst readily, leaving an infection-prone epidermal detachment behind. Body surface involvement in SJS occurs in less than 10%.[16]

Many children with SJS-TEN and TEN die from a variety of underlying health conditions rather than from the skin disease itself. Renal failure, septicaemia, bacterial infection, hepatic damage, epilepsy, and malignancy are all correlated with elevated mortality in SJS-TEN and TEN.[17] Severe erosion can impede the capacity to consume food and liquids, posing a life-threatening risk due to odynophagia, an intolerance to solid sustenance, and an increased likelihood of aspiration.[18] Unable to open the mouth wide. The lips can become extremely swollen with black or red crusts due to bleeding from ruptured blisters. Painful sores make the child reluctant to eat or drink, which can lead to dehydration and malnutrition. This case carries important clinical implications because paracetamol is one of the most frequently used medications in pediatric populations.

This medication acts as a mild cyclooxygenase-1 inhibitor non-immunologically, and elevated leukotriene production could be a mechanism of paracetamol hypersensitivity.[19] For a drug to be immunogenic and trigger an immune response, it must bind to proteins.[20] SJS may involve interactions between antigens or drug metabolites with cellular peptides or the major histocompatibility complex (MHC) type 1 to create immunogenic substances.[21]

Differential Diagnosis with Erythema Multiforme. Erythema multiforme in children is mostly associated with infection by the herpes virus; it can also be caused by drugs, and target lesions often appear together with blisters, so it is difficult to distinguish from SJS.[21]

In these situations, a multidisciplinary strategy is used to alleviate symptoms and stop additional disease consequences after early trigger identification and removal. In the early treatment of SJS/TEN, it is crucial to promptly stop taking any suspected causal medications. It is necessary to provide supportive care, which includes oxygen, pain management, nutritional evaluation, and hydration replacement.[22] There is no established standard for dental care for patients with SJS with severe oral lesions in terms of medical therapy. According to certain research, palliative care practices like supragingival cleansing, debridement, and the use of mouthwashes and gels like 2% lidocaine gel and 0.12% chlorhexidine mouthwash are.[23] This patient uses NGT for food intake assistance. In this case, Vaseline album 25 mg (perioral application), NaCl 0.9% (compress on the lips), and Minosep 0.1% (mouthwash) were used. High-dose systemic corticosteroids are considered capable of suppressing of immune reactions, controlling the expansion of the necrolysis process, reducing the area of lesions, and preventing damage to internal organs.[24] Management of oral lesions in patients given topical corticosteroids, 0.1% chlorhexidine gluconate mouthwash, for 3 weeks. Employing chlorhexidine gluconate 0.1% mouthwash as an antiseptic for oral hygiene aims to improve patient comfort, accelerate epithelialization, and prevent complications such as infection.[25]

In this case, mometasone furoate was used as a topical medication for lesions in the mouth. Mometasone is a synthetic, nonfluorinated corticosteroid of moderate potency, but effective, and has fewer side effects than other classes. Mometasone has several modes of action, such as antiproliferative and anti-inflammatory properties. Dermatosis

can be effectively treated with topical mometasone, which takes three days to three weeks to start working.[26] The cell cytosol is the binding site for glucocorticoid receptors. Comparing mometasone furoate to other corticosteroids, its receptor affinity is 22 times higher than dexamethasone.[27] The glucocorticoid receptor undergoes a conformational shift, separates from chaperones, and migrates to the nucleus when mometasone furoate binds to it.[28] Upon entering the nucleus, the receptor undergoes dimerisation and associates with DNA sequences known as glucocorticoid response elements, which either enhance the expression of anti-inflammatory molecules or suppress the expression of pro-inflammatory molecules, including interleukins 4 and 5.

To maintain oral hygiene, we used 0.12% chlorhexidine gluconate for cases. Chlorhexidine is a broad-spectrum antimicrobial agent effective against gram-positive and gram-negative bacteria, yeasts, and viruses. The antimicrobial activity of chlorhexidine is dose-dependent; it exhibits bacteriostatic effects at lower concentrations (0.02–0.06%) and bactericidal effects at higher concentrations (>0.12%).[23] Pharmacokinetic investigations of chlorhexidine mouthwash demonstrated that roughly 30% of the active compound remained in the oral cavity post-rinsing, gradually releasing into the salivary fluid. This case used 0.9% NaCl for lip compression. Physiological saline solution is a biocompatible fluid that aligns with bodily fluids. A 0.9% NaCl solution does not alter the pH of saliva, thereby maintaining the mouth's natural buffering capacity. 0.9% NaCl is not irritating, so the physiology of the oral cavity is maintained. In this way, the defence of the oral cavity will be reduced, and the risk of oral cavity infection will be reduced. This shows that oral hygiene using 0.9% NaCl is effective in preventing damage to the mucous membrane of the oral cavity. Saline solution (0.9% NaCl) is a safe, isotonic solution with low toxicity and non-irritating properties, which helps the tissue granulation process and thus accelerates healing.[29]

The primary limitation of this case report is the lack of confirmatory testing specific to acetaminophen. Nonetheless, such testing is not generally warranted in SJS, as this disorder exemplifies a delayed-type (Type IV) T-cell-mediated hypersensitivity reaction rather than an IgE-mediated allergy. Consequently, diagnosis is predominantly based on clinical presentation, the timing of drug exposure, and the exclusion of other potential causes. No formal causality assessment tool, such as the Naranjo Algorithm or the ALDEN score, was utilized to evaluate the probability of paracetamol being the implicated drug. Confirmatory allergy testing, such as lymphocyte transformation tests or patch tests, was not conducted, possibly due to cost limitations, which hindered definitive attribution to paracetamol. Furthermore, histopathological confirmation through skin or mucosal biopsy was not achieved. Despite the availability of fundamental hematologic investigations, a more extensive laboratory evaluation, encompassing liver and renal function tests, was not performed, hence limiting the entire assessment of systemic involvement.

Genetic predisposition is recognized to affect vulnerability to drug-induced SJS/TEN. While HLA genotyping was not conducted in this instance, prior research, including that of Kaniwa et al[30] has found HLA alleles linked to SJS induced by analgesics and antipyretics. Moreover, cross-reactivity between paracetamol and nonsteroidal anti-inflammatory medications (NSAIDs) has been documented, presumably owing to overlapping metabolic pathways and common hypersensitivity mechanisms.[31] These characteristics could not be assessed in the current case but remain significant concerns when assessing potential medication causality.

Conclusion

This example underscores that severe delayed-type hypersensitivity events, such as Stevens-Johnson syndrome, can manifest even with widely utilized and typically well-tolerated drugs like paracetamol. Management necessitates coordinated interprofessional care among pediatricians, dermatologists, and oral medicine specialists to achieve the best outcomes. Despite its rarity, paracetamol-induced Stevens-Johnson syndrome highlights the necessity for clinical monitoring, as these reactions can be perilous and life-threatening. Clinicians must retain a heightened level of skepticism for drug-induced hypersensitivity, even while administering drugs generally regarded as safe.

Ethical Approval

Informed written approval was acquired from the child's parent for the publication of this case report and any associated photos. Universitas Padjadjaran, as the institution, determined that ethical approval was unnecessary for this case report in accordance with its policy. Informed consent in writing was acquired from the patient's parent.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Disclosure

The authors report no conflicts of interest in this work.

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