

Research Article

Epidemiological Investigation of a Cluster of Contact Dermatitis Cases in a Tertiary Healthcare Hospital in New Delhi

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A B S T R A C T

Introduction: Facemasks significantly reduce the chance of airborne transmission of COVID-19 when worn by patients. However, facemasks have been associated with facial dermatoses.

Methodology: A cluster of cases with skin lesions on the faces of patients was reported from the Gynaecology and Obstetrics ward of a tertiary care teaching hospital in Delhi in February 2023. This study reports the investigation conducted for the cluster of cases. The patients were interviewed with the help of a case investigation sheet, and relevant records were checked.

Results: The investigation revealed that the cases of skin lesions reported in the ward were a cluster of contact dermatitis and not of any infective origin. The cluster was limited to eight patients over three days, who had been distributed masks from the same box of storage. No other cases were reported from the ward thereafter. The lesions were healing with the treatment for contact dermatitis.

Conclusion: The present investigation revealed that the cases of skin lesions reported in the ward were a cluster of contact dermatitis and not of any infective origin. The cluster was limited to eight patients over three days, who had been distributed masks from the same box of storage.

Keywords: Mask, Dermatitis, Cluster, Epidemiological Investigation, Healthcare Setting, Contact Dermatitis, N-95

Introduction

The COVID-19 pandemic has taught the world that prevention is better than cure. Subsequent to the global COVID-19 outbreak, all public places, including hospitals, have mandated precautionary measures to limit exposure

and transmission of airborne infectious particles. Facemasks are frequently used for this purpose. There have been controversial pieces of evidence regarding the use of facemasks and the reduction of airborne transmission of COVID-19.^{1,2} Face masks have also been associated with

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facial dermatoses.³

A cluster of cases with skin lesions on the faces of patients was reported from the Gynaecology and Obstetrics ward of a tertiary care teaching hospital in Delhi in February 2023. This study reports the investigation conducted for the cluster of cases with skin lesions.

Materials and Methods

According to ICD-10-CM, contact dermatitis is 'a type of acute or chronic skin reaction in which sensitivity is manifested by reactivity to materials or substances coming in contact with the skin'. It may involve allergic or non-allergic mechanisms.⁴ For investigation purposes, a probable case was defined as 'any person with facial lesions in the ward with a history of a visit to the labour room and Obstetrics Operation Theatre (OT) within the past week'. The data collection was conducted in February 2023.

An epidemiological investigation team was formed with doctors from the Departments of Gynaecology and Obstetrics, Community Medicine, Dermatology, and Microbiology. A case investigation sheet was developed for data collection. All wards of Obstetrics and Gynaecology were visited by the investigators with questionnaires. Verbal consent was obtained from all study participants. All case files were scanned for the required details. A Tzanck smear was ordered for laboratory investigations. No growth was reported in the Tzanck smears. Culture swabs from the lesions and their surroundings showed no growth of organisms.

A line list of all cases was maintained in an Excel sheet. A descriptive analysis of all the confirmed cases was done according to time, person, and place. Active and passive surveillance was conducted for fourteen days for the appearance of any other cases. All patients were contacted on the fifth and fifteenth days for follow-up. The nursing officers present on the days of the events at the ward, labour room, and operation theatre were also interviewed about mask storage.

The data were collected for epidemiological investigation and reporting. Patients were anonymised during data collection. Since the study utilised data retrospectively from the cluster investigation report and due to its urgency, informed consent from the patients and staff was obtained before data collection. Ethics approval was waived. All procedures adhered to the ethical guidelines of the Declaration of Helsinki.

Results

All wards of Obstetrics and Gynaecology were contacted, and a total of eight cases were identified. Eight patients were reported to have facial skin lesions appearing within a range of three days (February 19–21, 2023). All these

patients came to the hospital for their delivery and were delivered by Lower Segment Caesarean Section (LSCS), a day or the same day before the onset of symptoms.

The skin lesions were present on the cheeks bilaterally in the patients. The lesions were two to three centimetres in the highest diameter on average. Clinical history and physical examination of the probable cases confirmed the diagnosis of contact dermatitis.

All cases were pregnant women aged between twenty-three and thirty-five years. They underwent LSCS and delivered healthy, live babies. None of the babies reported similar lesions. The cases were pregnant women who came to the hospital for their delivery. They were admitted to the same labour room between the 16th and 23rd of February 2023 and all of them had LSCS in the same Operation Theatre (OT). They were all given N-95 masks from the same storage box to wear before entering the OT.

All cases gave a history of a burning sensation after wearing the mask before entering OT. After the operations, their attendants noticed the reddish lesions bilaterally on the face (cheeks), over the nose, typically on the areas covered by the masks. The reddish lesions developed into indurated lesions. We recorded photographs over consequent days to report the evolution of the lesions over time. Figure 1 shows a lesion on day zero, immediately after itching was felt. Figure 2 shows a lesion on day 1. Figure 3 shows a lesion on day 2 and Figure 4 shows a lesion on day 3. One of the cases specifically reported having worn the mask improperly over the side and nape of the neck and had lesions on the same areas (Figures 1 and 3). For each patient, there were approximately two to three lesions which were plaques, vesicular, and papular in nature, on the day of investigation. Patients were given Fusidic acid cream and Mometasone cream for local application by the Dermatologist. Oral antihistamines were also prescribed.



Figure 1. Lesion in a Patient on Day 0 Immediately after Onset of Symptom of Itchiness



Figure 2. Lesion in a Patient on Day 1



Figure 3. Lesion in a Patient on Day 2



Figure 4. Lesion in a Patient on Day 3

A detailed description of each patient is as follows:

1. The first case was a primiparous lady, 24 years old, who was admitted to Ward IV on February 18, 2023. She delivered her baby (term) on February 20, 2023 by LSCS (indication: non-progress of labour). She presented with three diffuse rashes in the form of plaques and blisters on the right side of the neck, associated with a burning sensation and fever for one day. It was not associated with itching or pain.
2. The second case was a multiparous lady, 28 years old, admitted to Ward IV on February 20, 2023. She delivered her baby on February 20, 2023 by LSCS (indication: oligohydramnios). She presented with five small rashes which were vesicular in nature. They gradually increased in size and became plaques and papules on the left cheek, ear, and neck. The rashes were associated with an intense burning sensation and fever for one day. They were not associated with itching or pain.
3. The third case was a multiparous woman, admitted to Ward IV on February 21, 2023. She underwent LSCS (indication: non-progress of labour) and delivered a healthy baby. She experienced a burning sensation on her left cheek within one hour of her delivery, and her attendant noticed a skin rash on her left cheek. Over a period of two days, she developed four rashes in the form of plaques and blisters on the left cheek and the left side of the neck, distinctly in the areas where the mask was in contact with the skin. She also reported a history of fever for one day. There was no itching or pain associated.
4. The fourth case was a multiparous woman, admitted to Ward V on February 19, 2023. She was hepatitis C positive. Her delivery was done on February 20, 2023 by LSCS (indication: gestational hypertension associated with maternal tachycardia). She developed multiple rashes on the same night of delivery associated with an intense burning sensation that prevented her from sleeping. There was one big plaque on the nape of the neck and two to three small vesicles on both cheeks. There was no association with fever, pain, or itching.
5. The fifth case was a multiparous lady, admitted to the isolation ward on February 17, 2023. She was a case of chronic hypertension. Her LSCS (indication: non-progress of labour) was done on February 18, 2023. She presented with a rash immediately after leaving the OT. There was a single rash in the form of a plaque on the right cheek. It was associated with a burning sensation. It was not associated with itching or pain. There was no history of fever.
6. The sixth case was a multiparous woman, 31 years old, admitted to Ward V on February 19, 2023. She delivered her baby by LSCS (indication: non-progress of labour) on February 20, 2023. Her doctor noticed some redness on the left side of her neck. It was associated with a burning sensation. On the same night, she developed two rashes in the form of a plaque and a blister on the left cheek and left side of the neck. The next day she developed a pustule. However, there

was no fever, itching, or pain. The dermatologist confirmed a secondary bacterial infection in this case and prescribed oral antibiotic medication (Figure 5).



Figure 5. Lesion in a Patient on Day 2 (With Secondary Infection)

7. The seventh case was a primigravida, 24 years old, admitted to Ward V on February 19, 2023. She underwent LSCS (indication: non-progress of labour) on February 20, 2023. She presented with two rashes, one of which was a plaque on the right side of the neck and the other was a papule on the right cheek. They gradually increased in size. The rash was associated with a burning sensation. There was no pain, itching, or fever.
8. The eighth case was a multiparous lady, 24 years old, admitted to Ward V on February 16, 2023. She delivered her baby by LSCS (indication: foetal distress) on February 20, 2023. She felt a burning sensation just a few minutes after wearing the mask. Within a few hours of delivery, she developed two rashes in the form of vesicles and a plaque on the right cheek and left side of the neck. There was no history of fever. The rash was not associated with itching or pain.

All cases were interviewed on February 23, 2023. No other cases were reported on subsequent days. Patients were advised to follow up at the Dermatology outpatient department (OPD). Patients were contacted over the phone by the investigators for follow-up about the rash. All patients reported that the lesions were healing with treatment. Investigators requested patients to send photos on the fifteenth day and thereafter one and a half months

later. Figure 6 shows a lesion of a patient on day 15. Three of the eight patients sent photos. The inflammation was reduced in all cases, however, the scars persisted. They were again advised to visit the Dermatology OPD.



Figure 6. Lesion in a Patient on Day 15

Discussion

Any infective cause for the lesions was ruled out by the investigation. The absence of organism growth in culture swabs nullified an infective origin. There was no person-to-person transmission reported, which again pointed to the diagnosis of non-infective causes of the skin lesions. It was concluded that the face mask contained allergens causing the lesions. The offending agent of the face mask was not obvious from our investigation. Since all the masks in the storage box were used up in the three days and the box had been discarded, laboratory investigation of the masks/ box was not possible. The possibility of external allergens contaminating the storage box of masks cannot be ruled out.

Previously, there have been observations of allergic contact dermatitis (ACD) due to formaldehyde releasers in face masks.^{4,5} Polyurethanes, found in the sponge strip within masks, are created from diisocyanates and may lead to ACD or trigger asthma attacks.⁶ The prevalence of allergic contact dermatitis (ACD) associated with mask usage has increased amid the COVID-19 pandemic. Nevertheless, these reactions are not confined to pandemic circumstances; healthcare practitioners, such as surgeons, routinely wear masks for prolonged durations as part of their professional responsibilities. Instances of ACD have been documented, stemming from allergic responses to elastic straps, adhesive materials, and formaldehyde emitted from mask fabric. Concurrently, irritant contact dermatitis has been noted on the cheeks and nasal bridge, particularly among individuals with a previous history of atopic dermatitis who wear masks continuously (> 6 hours).^{7,8}

Acne (26%), allergy symptoms (24%), traumatic symptoms (24%), and other symptoms (26%), were among the significant dermatological manifestations attributed to the

usage of facemasks reported by individuals. Rashes, itching, and redness were the most common allergy symptoms, while cracked skin, blistering skin, and pressure sores were the most common traumatic complaints. Other complaints reported by individuals included skin dryness and changes in skin colour.⁹ Szepietowski et al. reported an increased risk of adverse skin reactions with mask use for individuals with sensitive skin (OR: 3.40, 95% CI: 2.47–4.69), atopic predisposition (OR: 2.25, 95% CI: 1.72–2.95), atopic dermatitis (OR: 1.92, 95% CI: 1.35–2.75), acne (OR: 1.29, 95% CI: 1.13–1.49), or seborrheic dermatitis (OR: 1.30, 95% CI: 1.11–1.51).¹⁰

Pregnancy affects a variety of skin disorders because of the immunological changes that occur as a result of pregnancy, i.e., TH2 response is greater during pregnancy and TH1 response is greater in the postpartum period.¹¹ Th1 cells activate the type-1 pathway (“cellular immunity”), which fights viruses and other intracellular pathogens, eliminates malignant cells, and induces delayed-type hypersensitivity (DTH) skin reactions. Th2 cells activate the type-2 pathway (“humoral immunity”) and increase antibody production to combat extracellular pathogens; type 2 dominance is associated with xenograft tolerance and foetal tolerance throughout pregnancy. Overactivation of either pattern can result in disease, and one pathway can inhibit the other.¹² Pregnancy makes females more prone to infections and allergies.

Our study is not beyond limitations. We could not have laboratory confirmation of the diagnoses for the allergen. However, it was clinically confirmed, and the cases responded to the treatment.

Conclusion

The present investigation revealed that the cases of skin lesions reported in the ward were a cluster of contact dermatitis and not of any infective origin. The cluster was limited to eight patients over three days, all of whom had been distributed masks from the same storage box. No other cases were reported from the ward. The patients were healing with the treatment for contact dermatitis.

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Conflict of Interest: None

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