Case Report

Blood group discrepancy in snakebite management: Unravelling the culprit

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Abstract:

Snakebite envenomation is a global health concern that can result in significant morbidity and mortality. Accurate blood grouping and cross-matching are critical components of effective management, particularly when administering antivenom therapy. We present a case of a 54-year-old female who was admitted with a snakebite (Bunggrus caeruleus) and initially found to have B Rh(D) positive blood group. However, a discrepancy in the patient's blood grouping was identified on the third day of hospitalization, with the reverse grouping indicating group AB. Investigation revealed that the patient had received neuro polyvalent snake antivenom, which likely caused the discrepancy. The presence of A-like substances in equine-derived ASV (anti-snake venom) can effectively neutralize anti-A antibodies, leading to erroneous blood grouping results. This case highlights the potential for ASV to cause discrepancies in blood grouping and emphasizes the importance of laboratory personnel and clinicians being aware of this possibility. It also underscores the need for blood grouping discrepancy resolution and cross-matching with the correct unit. Healthcare professionals should consider advising patients who are to receive ASV to give blood grouping samples before ASV infusion and carry cards indicating their true blood types. Overall, a greater awareness of the potential for ASV to cause blood grouping discrepancies can improve patient outcomes in the management of snakebite.

Keywords : ● *Anti snake venom* ● *A-like substances* ● *Grouping discrepancy* ● *Missing antibodies*

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Introduction

The World Health Organization (WHO) estimates that in India about 5 million snakebites occur each year, resulting in up to 2.7 million envenomings. Published reports suggest that between 81,000 and 138,000 deaths occur each year.[1] While the immediate goal of treatment is to neutralize the venom's effects, administering the appropriate antivenom is critical to achieving a positive clinical outcome. However, antivenom therapy is not always straightforward as it causes discrepancies in the patient's blood grouping and the antivenom can cause complications that may compromise treatment efficacy. This case highlights the importance of accurate blood grouping and cross-matching in snakebite management, as well as the potential for blood grouping discrepancies to occur even in apparently straightforward cases. We hope that this report will contribute to a greater awareness of this issue among healthcare professionals and lead to improved patient outcomes in the management of snakebite.

Case report

We present a case of a 54-year-old female who was admitted to the hospital with snakebite from Bengal Krait (Bunggrus caeruleus-neurotoxic) on her left foot. Upon admission, her blood grouping was determined to be B Rh-positive using the automated microplate hemagglutination technology (IMMUCOR NEO) without any discrepancy (Table 1). The patient was immediately treated with neuro polyvalent snake antivenom bolus of 200 mL followed by 100 mL every 6 hours and was closely monitored for any adverse reactions.

On the third day of hospitalization, the patient's blood grouping report (We repeated the blood grouping as it is our policy to do two blood grouping tests from samples obtained from different phlebotomies before every blood product issue) showed a discrepancy (Table 2). The report showed that the patient was now B Rh(D) positive in the forward and AB in the reverse grouping, which was inconsistent with her original blood grouping report. This unexpected finding raised concerns of a potential laboratory error, so the blood sample was retested using a different method, the semi-automated gel column agglutination technique which also gave us the same result (Figure 1).

A fresh sample was requested as a part of our SOP (standard operating protocol) to resolve blood grouping reports inconsistent with historical record of grouping.[2] The pre-antivenom sample also was tested for blood grouping using semi-automated gel column agglutination

Table 1 Blood grouping of the patient before ASV (anti-snake venom) infusion

	Forward grouping		Reverse grouping	
	Anti-A	Anti-B	A_1 cells	B cells
Patient	0	4+	4+	0
Positive control	4+	4+	4+	4+
Negative control	0	0	0	0

Table 2 Blood grouping of the patient after ASV infusion

	Forward grouping		Reverse grouping	
	Anti-A	Anti-B	A_1 cells	B cells
Patient	0	4+	0	0
Positive control	4+	4+	4+	4+
Negative control	0	0	0	0

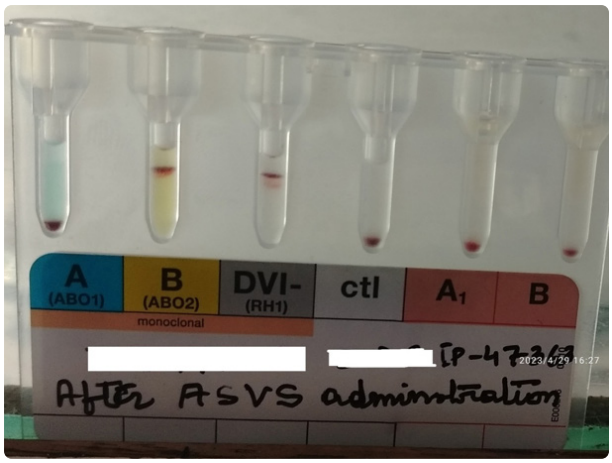

Figure 1 Blood grouping after ASV infusion

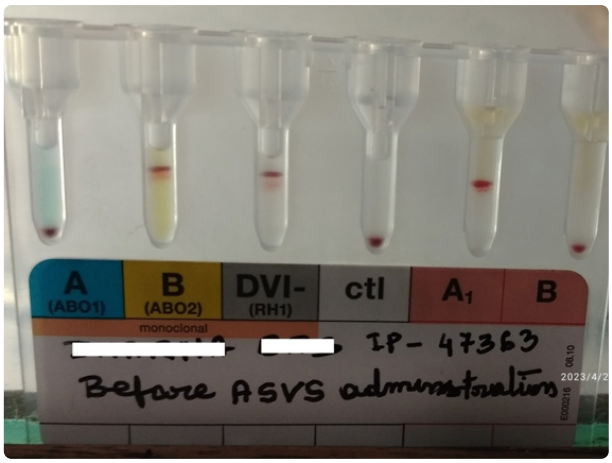

Figure 2 Blood grouping before ASV infusion

Figure 3 Serum + A pooled cells after room temperature incubation

Figure 4 Serum + A pooled cells after 4°C incubation

technique to cross-check (Figure 2) which showed no discrepancy. The fresh sample tested also showed that reverse grouping was AB. The laboratory personnel then contacted the ward to inquire whether she had received any immunosuppressive drugs, blood transfusions or had a recent bone marrow transplant, but the nursing staff denied any such procedures.

Following our departmental SOP to resolve this Type 1 discrepancy we tried enhancing the weak or missing reaction in the serum by incubating the patient serum with A pooled and B pooled cells at room temperature for 15-30 minutes by conventional tube technique, however there was still no reaction on centrifugation (Figure 3). Following this, we proceeded further by incubating the serum-cell mixtures at 4°C for 15-30 minutes which still resulted in no reaction with the A pooled cells[2] (Figure 4).

Taken together, it can be implied that the patient is of B Rh(D) positive blood group. The most plausible explanation of the discrepancies is that anti-A antibodies in patient's plasma was neutralized by the A-like substances in the horse serum. For all further transfusions, we crossmatched patient's sample with packed red blood cells from the donor with blood type B with Rh(D) positive under anti-human globulin (AHG) (anti-human globulin) phase at 37°C and issued the blood products. The repeat blood grouping performed 7 days after the administration of ASV also indicated a B positive blood type without any discrepancies.

Discussion

In this case, the patient's blood grouping report showed a discrepancy after the administration of antivenom therapy, which raised concerns of a potential laboratory error.

To solve this discrepancy, the laboratory staff followed their standard operating protocol, including obtaining a fresh blood sample from the patient and repeating the blood grouping test using a different method. However, the fresh sample also showed a similar result, which led to further investigation.

Based on previous studies[3-7], the potential cause of the discrepancy was the use of polyvalent antivenom, which contains constituents that may act as antigens to neutralize anti-A. As a result, the anti-A antibodies in the patient's serum were effectively neutralized, leading to an inaccurate blood grouping report. However, it is inappropriate to draw any conclusions at present. Further experiments were needed to be performed to confirm the results, including ABO molecular typing and in vitro study in order to confirm the effects of anti-A neutralization of snake antivenom.

The findings from this case highlight the need for healthcare professionals to be aware of potential discrepancies in blood grouping reports after the administration of antivenom therapy. It is essential to consider the possibility of neutralization of the patient's natural antibodies by the A-like substances present in the antivenom serum.

Conclusion

This case highlights the potential for ASV to cause discrepancies on blood grouping tests. It is important for laboratory staff to be aware of this possibility when interpreting blood grouping reports for patients who have received ASV. Clinicians should also be aware of this possibility and consider delaying blood typing until after ASV administration for at least 5 days if feasible. Blood samples from patients who are to receive ASV should be collected priorly on the potential for future blood typing discrepancies and advised to carry a card indicating their true blood type.

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References

1. *World Health Organization. (2019). Snakebite in India. Available from: https://www.who.int/india/health-topics/snakebite#:~:text=Snakebite%20in%20India-,Snakebite%20in%20India,138%2C000%20deaths%20occur%20each%20year.*
2. *Harmening DM. Modern blood banking and transfusion practices. 7th ed. Philadelphia: F.A Davis. 136-8.*
3. *Product information. ASVS-ASIA, snake venom antiserum I.P. Thane (India): Bharat Serums & Vaccines Ltd.*
4. *Shastry S, Bhat SS, Singh K. A rare case of missing antibody due to anti-snake venom. Transfusion. 2009;49:2777-8.*
5. *Kakkar B, Mallhi RS, Philip J. Type I ABO discrepancy due to missing antibody attributable to anti-snake venom in two patients: a rare presentation. Transfus Apher Sci. 2022;61:103437. doi: 10.1016/j.transci.2022.103437.*
6. *Theakston R, Warrell D, Griffiths DA. Report of a WHO workshop on the standardization and control of antivenoms. Toxicon. 2003;41:541-7.*
7. *Zoutendyk A. Blood group susbtances in antitoxic sera; a potential transfusion hazard. S Afr Med J. 1952;26:768-9.*