Lidocaine Tape Application for 3 Hours Prevents Vasovagal Syncope During Venipuncture: A Case Series

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Vasovagal syncope (VVS) or reflex is usually caused by physical and mental stress-related factors, like pain, anxiety, and fear, and it is one of the most frequent complications during dental treatment. Two patients, both with histories of dental phobia and of VVS during vaccination, venipuncture, and dental treatment with local anesthetics, were scheduled for dental treatment under intravenous (IV) sedation. However, both experienced episodes of VVS that occurred during venipuncture using a 24-gauge indwelling needle. We determined that pain was the main trigger of VVS for these patients and attempted to reduce venipuncture-associated pain using 60% lidocaine tape applied 3 hours before venipuncture at their next dental visits, respectively. Use of the lidocaine tape was successful and permitted comfortable placement of the IV catheter without any onset of VVS.

Key Words: Intravenous sedation; Lidocaine tape; Sinus arrest; Vasovagal syncope (reflex); Venipuncture.

Vasovagal syncope (VVS) can be triggered by emotional stress or pain even from relatively innocuous procedures like venipuncture and often occurs perioperatively. Not only can it be extremely uncomfortable or embarrassing for the patient, but it can also lead to postponement or case cancellation as well as more serious medical issues, especially in medically compromised patients. Thus, it is important to recognize and prevent VVS whenever possible. This case series presents the successful preoperative application of lidocaine tape to prevent VVS in 2 patients with histories of VVS following venipuncture.

CASE PRESENTATION

A 26-year-old otherwise healthy female (Case 1: height, 152 cm; weight, 52 kg; body mass index, 22 kg/m^2; American Society of Anesthesiologists physical status [ASA-PS] = 1) and a 21-year-old otherwise healthy male (Case 2: height, 180 cm; weight, 59 kg; body mass index, 18 kg/m^2; ASA-PS = 1) each had histories of dental phobia and VVS following local anesthetic use during dental treatment. Moreover, both patients reported histories of syncope during other painful medical procedures such as vaccination and phlebotomy. Accordingly, they were scheduled to undergo dental treatment under intravenous (IV) moderate sedation due to dental phobia and to help mitigate VVS during treatment. However, while Case 1 was in the supine position and Case 2 was in the sitting position, both patients experienced VVS while attempting venipuncture with a 24-gauge catheter. The patients in both instances complained initially of dysphoria, then became pale, temporarily lost consciousness, and subsequently began convulsing. Furthermore, their respective blood pressures and heart rates decreased significantly during the VVS episodes with noted brief periods of sinus bradycardia/arrest observed (Figure 1). The lowest blood pressures and heart rates recorded during the VVS episodes were 72/47 mm Hg, 43 bpm (Case 1) and 53/27 mm Hg, 42 bpm (Case 2). After diagnosing both patients with VVS, we elevated their legs while reclining them into the supine position and administered IV atropine 0.5 mg and midazolam 3 mg. VVS symptoms rapidly resolved thereafter, and dental treatment under IV moderate sedation using midazolam and propofol was completed uneventfully in both cases. However,

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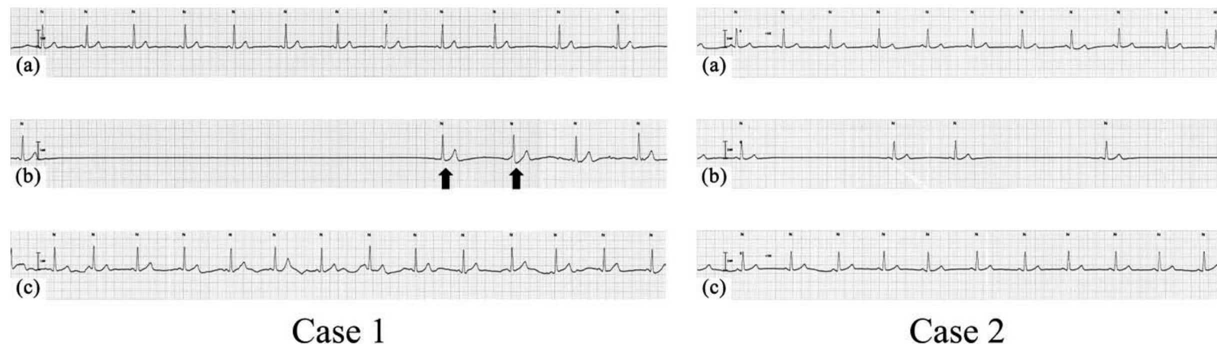
Figure 1. ECG Tracings Captured During VVS

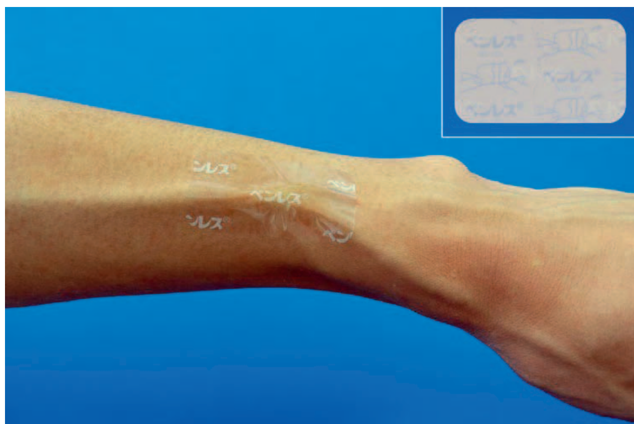


ECG recorded (a) before IV start, (b) during VVS episode, and (c) after recovery. In Case 1, sinus arrest was observed for ∼12.7 seconds before the occurrence of escape rhythms (arrows). In Case 2, sinus arrest was observed for ∼3.4 seconds. ECG, electrocardiogram; VVS, vasovagal syncope.

both patients had additional dental needs that required further treatment to complete.

We concluded that the VVS episodes in Cases 1 and 2 were triggered by pain, thus we decided to take preventive measures to reduce venipuncture pain in the future. Each patient was given pictorial instructions to self-apply 60% lidocaine tape (Penles Tape 18 mg; Maruho Co Ltd; Figure 2) at the identified venipuncture site 3 hours prior to their next scheduled dental visit. The patients self-applied the lidocaine tape at their house, and we confirmed appropriate placement and use of the lidocaine tape upon their arrival to the hospital. We removed the tape before venipuncture procedure. For the second venipuncture attempt with the use of lidocaine tape, Case 1 was placed in the sitting position, whereas Case 2 was placed in the supine position. Although the supine position is generally considered suitable for venipuncture in patients with a history of VVS to prevent VVS, the patient in Case 1 requested to be in a sitting position if there would be no pain; hence, venipuncture was performed in a sitting position in Case 1. Both patients were asked to rate their pain levels on a numeric rating scale at the end of the dental visit where lidocaine tape was utilized. Pain levels during venipuncture without lidocaine tape were 5 and 6 in Cases 1 and 2, respectively, while pain levels were 0 for both cases when lidocaine tape was applied for 3 hours. Conclusively, self-applying of lidocaine tape at the venipuncture site 3 hours prior to the venipuncture successfully prevented recurrence of VVS episodes in both cases, and each patient commented that the venipuncture procedure was very comfortable with no pain/discomfort being felt.

Figure 2. 60% Lidocaine Tape on Venipuncture Site



Patients were directed to self-apply lidocaine tape containing 18 mg of lidocaine at the previously identified venipuncture site 3 hours prior to venipuncture.

DISCUSSION

VVS is usually caused by physical and/or mental stress-related factors, such as pain, anxiety, and fear,[1,2] and has been reported to occur immediately after IV catheter placement before IV sedation with a known probability of 0.2%.[3] Although the incidence of VVS before IV sedation is low, we believe that it is extremely important to reduce the pain, onset, and burden of VVS on patients. In this case series, we were able to prevent the onset of VVS by applying lidocaine tape for 3 hours, which aided in performing painless venipuncture. Despite these results, it should be noted that there may have been an effect of recall bias since pain levels were only probed on the subsequent dental visit.

In this case series, the application time of 3 hours for the lidocaine tape was determined based on previous research.[4] It has been reported that a 6- to 8-hour application of lidocaine tape is optimal for pain relief in venipuncture.[5] However, it is possible that the shorter

application time (3 hours) was sufficient to prevent pain during venipuncture given that the needles used were much thinner (24-gauge) than those (20-gauge) in the previous study.[5]

Application of lidocaine tape is straightforward and has few side effects, but its main drawback is the need for an extended application period (minimum of 3 hours). Recently, it was reported that applying a eutectic mixture of local anesthetic (EMLA) cream for 1 hour was more effective for venipuncture pain relief than applying lidocaine tape.[6] Therefore, the use of EMLA cream may compensate for the drawback of lidocaine tape. Nonetheless, we recommend lidocaine tape for self-application since tape formulations of lidocaine are easier to self-apply than EMLA cream formulations.

Combined application of 60% lidocaine tape and low concentration of nitrous oxide during venipuncture has also been shown to prevent VVS.[7] Furthermore, venipuncture performed with the patient in the supine position is also known to help reduce VVS incidence.[8] Therefore, we believe that a combination of these methods in addition to the application of lidocaine tape can further prevent the occurrence of VVS for at-risk patients, and we especially recommend their consideration for all patients with a history of VVS during venipuncture.

CONCLUSION

This case series presents the successful use of 60% lidocaine tape applied over the planned venipuncture site 3 hours prior IV placement in 2 patients with histories of VVS during IV cannulation. Use of lidocaine tape along with other measures like nitrous oxide and positioning the patient in the supine position can help mitigate pain and prevent pain-induced VVS, thereby promoting patient safety and satisfaction.

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