Accidental Intra-Arterial Diazepam Injection: A Case Report of Psychiatric Patient Managed at an Under-Resourced Healthcare Facility

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Abstract

Accidental intra-arterial injection of diazepam is an uncommon but potentially devastating complication. It could occur when parenteral diazepam is inadvertently given intra-arterial instead of intravenously. Cases have been reported globally, however, more are not reported especially when it occurred at under-resourced healthcare facilities. This case report detailed a case of Mr. K A, a 42-year-old plumber who was managed at a rural nursing home. He was accidentally given intra-arterial diazepam instead intravenous in the ante-cubital fossa of the left upper extremity. The patient presented with physical aggression during an episode of psychotic disorder. Two days after the injection, the patient complained about pain and swelling in the left hand and fingers, for which oral analgesic was administered and patient was reassured. Also, skin discolouration was observed after the 5th day. The condition deteriorated after about 6 weeks with skin becoming darker, absent of peripheral pulse in the left upper arm and gangrenous changes and falling off of two fingers. Relatives demanded for referrer to a psychiatric facility at this point because the patient was still psychotic. However, patient was immediately referred to a teaching hospital where there would be orthopedic and plastic and reconstructive surgeons as well as psychiatrists. The case highlights the importance of adequate training of health workers on injection technique and timely recognition of signs and symptoms suggestive of complications of intra-arterial injection.

Keywords: Diazepam, intra-arterial injection, complication, case report, schizophrenia

Diazepam is a benzodiazepine medication widely used for its sedative, anxiolytic, and anticonvulsant properties.[1] It is typically administered intravenously (IV) or intramuscularly (IM). Benzodiazepines are among the widely used agents for chemically restraining aggressive patients in psychiatric practice universally. Parenteral diazepam is commonly used, and the preferred route of administration is the intravenous and not intramuscular route. When diazepam is given intramuscular, its absorption could be erratic, hence, it may not achieve immediate sedation desired.[2] Diazepam is affordable and readily available thus, it is preferred as a chemical restraint where need be. Aside their uses in tranquilization, is their use in the management of acute dystonic reaction where they serve the purpose of muscle relaxation in patients on antipsychotics.[3]

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However, when administered by unskilled individuals, parenteral diazepam can erroneously be administered intra-arterially instead of intravenous route. Accidental intra-arterial injection can lead to severe complications, including arterial spasm, thrombosis, and tissue ischemia, potentially resulting in gangrene and limb amputation.[4]

Case Report

Mr. KA is a 42-year-old married plumber who presented with his 3rd episode of mental illness to a healthcare facility in suburban area, under the supervision of a psychiatric nurse. The presenting complaints were 8 weeks' history of aimless wandering, second- and third-person auditory hallucinations, talking out of context and verbal and physical aggression. The two previous episodes of mental illness were similar to the index episode. There was no previous history of chronic medical illness, neither was there history of psychoactive substance use. Patient had no known drug allergies. The relative gave the history that the patient was said to be uncooperative, disruptive, physically and verbally aggressive at presentation, despite attempts at verbal de-escalation. Patient was then physically restrained

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and thereafter administered IM Chlorpromazine 100mg and IV Diazepam 20mg was likewise administered by an assistant nurse in the ante-cubital fossa of the left upper extremity. He subsequently was placed on tablets haloperidol, and chlorpromazine and dose were titrated with patient's clinical response. Patient thereafter, complained of pain and swelling in the distal part of the affected extremities (hand and fingers) two days after the administration of the injection. The managing health personnel at the center reassured them that the pain was as a result of concomitant use of physical restraints thus, oral analgesic was administered. Pain subsided but for few hours before it escalated again, there was gradual discolouration of the skin by the 5th day. Thereafter, oral antibiotics were commenced, however, the discolouration worsened, so were the psychopathologies. After few weeks, the relatives reported that the index and middle fingers fell off from the hand. The relatives at this point requested for referral when the condition continue to deteriorate after 6 weeks on admission.

At our facility, in addition to the psychotic symptoms, there was also complaint of pain in the left upper limb, with skin colour changing to dark black and skin excoriation. On examination, the patient was in obvious distress, with foul smelling wound on the left upper limb. The left arm was black and tender to touch, with auto-amputation of index and middle fingers. There was no arterial pulsation in the cubital fossa and radial artery. Assessment of gangrenous left forearm and hand secondary to accidental intra-arterial diazepam injection in a patient with schizophrenia was made. Patient was promptly referred to a teaching hospital in the town for orthopaedic surgeon and plastic and reconstructive surgeon to review and take over the management, because these were no such specialists at our center.

Discussion

Intra-arterial injection of diazepam, though uncommon, can lead to significant complications due to its chemical properties and the vascular response it triggers. Diazepam is a benzodiazepine with a pH that is highly alkaline (around 11), and when injected intra-arterially, it can cause severe local tissue damage.[5] Diazepam's alkaline pH can also cause immediate endothelial damage upon contact with arterial walls. This can lead to vasospasm, thrombosis, and necrosis at the injection sit.[6] Another mechanism through which intra-arterial injection of diazepam is by inducing vasospasm which can compromise arterial blood flow distal to the injection site, leading to tissue ischemia. Likewise, local endothelial damage and vascular spasm can trigger thrombus formation at the injection site, leading to arterial occlusion. Pieces of thrombi or fragmented arterial wall can embolize to distal arterial beds, causing further ischemic complications, hence resulting in gangrene of the tissue.[7]

Cases of intra-arterial diazepam injection has been reported in different circumstances. Many has occurred in medical and surgical wards for procedures such as for relaxation before endoscopy or minor surgical procedures.[8] Self-administered intra-arterial diazepam injection also reported and intravenous drug users.[9] Accidental case of intra-arterial diazepam injection in a psychiatric setting was reported in a 21-year-old male in Mali.[10] Similar to this index case, the sedation was

necessitated because of persistent aggression. This present case is important because, the injection was administered by a poorly skilled individual, and signs and symptoms of the vaso-occlusion and subsequent development of necrotic process were missed hence, treatment was never instituted.

Management of complications from intra-arterial diazepam injection involves prompt recognition and intervention. If detected early, stopping the injection and removing any remaining drug can limit further damage. Patient can then be managed symptomatically by taking care of the pain, managing systemic effects (e.g., sedation, respiratory support), and stabilizing cardiovascular status are crucial. In severe cases with significant ischemia or thromboembolic events, surgical consultation may be necessary for vascular repair or embolectomy.[11]

The case highlighted that adequate care must be taken while giving parenteral intravenous injection to patients, and more importantly, violent and aggressive psychiatric patients. Health workers also need to know their limit skill-wise and refer cases on time. This particular case, the treatment center kept the patient despite complain for six weeks until the relatives pressured for referrer.

Conclusion

Intra-arterial injection of diazepam might be under reported especially if it happened in community setting. However, serious complications such as local tissue damage with potential limb gangrene and auto-amputation, could inadvertently occur. Rapid recognition, cessation of injection, and appropriate management are essential to minimize morbidity and mortality associated with this iatrogenic event.

References

1. Sanabria E, Cuenca RE, Esteso MÁ, Maldonado M. Benzodiazepines: their use either as essential medicines or as toxics substances. Toxics. 2021 Feb 1;9(2):25.

2. Sturdee D. Diazepam: Routes of administration and rate of absorption. British journal of anaesthesia. 1976, 48. 1091-6. 10.1093/bja/48.11.1091.

3. Aslam I, Jiyanboyevich YS, Ergashboevna AZ, Farmanovna IE, Yangiboevna NS. Muscle Relaxant for Pain Management. Open Access Repository. 2022 Jan 6;8(1):1-4.

4. Joist A, Tibesku CO, Neuber M, Frerichmann U, Joosten U. Gangrene of the fingers caused by accidental intra-arterial injection of diazepam. Deutsche Medizinische Wochenschrift (1946). 1999 Jun 1;124(24):755-8.

5. Stefan M, Stefan I, Negoita IA, Ordeanu V, Stefan DS. Influence of internal structure of the sorbents on diazepam sorption from simulated intestinal fluid. Applied Sciences. 2021 Jan 27;11(3):1158.

6. Stefanos SS, Kiser TH, MacLaren R, Mueller SW, Reynolds PM. Management of noncytotoxic extravasation injuries: A focused update on medications, treatment strategies, and peripheral administration of vasopressors and hypertonic saline. Pharmacotherapy: The Journal of Human Pharmacology and Drug Therapy. 2023 Apr;43(4):321-37.

7. Zhou S, Zhao W, Hu J, Mao C, Zhou M. Application of nanotechnology in thrombus therapy. Advanced Healthcare Materials. 2023 Mar;12(7):2202578.

8. Yoshiyuki K, Sho K, Takahiro K, Naoki H, Norihisa K, Aya S. Accidental Intraarterial Injection of Diazepam Caused by Misidentifying a Superficial Radial Artery as a Cephalic Vein. Japanese Journal of Vascular Surgery, 2024; 33(4): 179-183.

9. Katrancioglu N, Manduz Ş, Sanrı U, Karahan O, Berkan Ö. Accidental intra-arterial diazepam injection: A case report. Cumhuriyet Medical Journal. 2010 Nov 13;32(4):368-70.

10. Togola B, Bengaly B, Ouattara D, Drissa E, Traoré D, Coulibaly M, et al. Gangrene of the Fingers after Accidental Intra-Arterial Injection of Diazepam in Mali: Case Report and Review of the Literature. Cardiology & Vascular Research. 2020, 4. 10.33425/2639-8486.1072.

11. Rohm S, Staab H, Schulz H, Richter O, Aust G. Good clinical outcome after accidental intra-arterial injection of flunitrazepam tablets in 16 drug abusers with critical limb ischaemia. European Journal of Vascular and Endovascular Surgery. 2014 Jan 1;47(1):61-7.