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Breaking New Ground with Vertebroplasty in a 60-Year-Old Man in Ghana: A Case Report and Literature Review

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Abstract

Percutaneous vertebroplasty is a minimally invasive procedure famed for its widespread use in augmenting and stabilizing vertebral body compression fractures, primarily to reduce pain, and until now, has been little practiced in sub-Saharan Africa. We present the case of a 60-year-old male patient with intractable back pain attributed to multiple-level vertebral compression fractures on imaging. We went on to discuss the novel use of this technique in Ghana, highlighting the intended outcomes vis-à-vis providing relief in symptomatology, spinal stability, and improved patient mobility while touching on the prevailing local challenges related to operational costs, local availability of the vertebroplasty kit, and strategies required to formalize the process.

Keywords

Percutaneous Vertebroplasty, Vertebral Body Compression Fractures, Pain, Ghana

1. Introduction

The increasing incidence of late-stage cancers and rising numbers of osteoporosis in sub-Saharan Africa suggest a rising burden of related spinal compression fractures [1]. While these have been insufficiently researched, the resultant significant disease burden cannot be overstated. A recent study in Sub-Saharan Africa put the prevalence of osteoporosis between eighteen and sixty-six percent across a di-

verse population at risk [2].

Spinal compression fractures cause severe pain, immobility, and deformity [3]. This may directly lead to other health-related concerns like deep venous thrombosis, pulmonary embolism, atelectasis, and pneumonia, all contributing to a poor outcome for the patients. In some cases, the primary symptom is pain which may become intractable and unresponsive to conservative management including opioid analgesia, braces, and bed rest.

Vertebroplasty (VP) introduces cement material commonly, polymethyl methacrylate (PMMA) into the trabecular bone of the vertebral body to stiffen the bone against further compression [4]. It provides pain relief via strategies such as stabilizing the microfractures and destruction of pain receptors from the exothermic reaction of the cement, among others [5]. Recent studies have also shown its superiority and faster onset of action when compared to other techniques like radiotherapy [5]. According to the percutaneous vertebroplasty versus conservative therapy in patients with painful osteoporotic vertebral compression fractures (VERTOS II) and safety and efficacy of vertebroplasty for acute painful osteoporotic fractures (VAPOUR) trials, patients who underwent vertebroplasty procedures showed significant pain relief, more pain-free days, and improved functional goals [6]. When performed by skilled medical professionals such as neuroradiologists, the procedure offers safe and cost-effective pain relief as well as improved quality of life in selected patients [7]. It is imperative to provide vertebroplasty services in the West African Subregion, as it is an invaluable treatment option, as elucidated in this case report.

2. Case Presentation

We present a 60-year-old man who complained of progressive severe back pain for over 4 months, with a pain intensity score of 9/10, leading to difficulty with mobility. Pain was constant during the day and night with no relieving or aggravating factors. He had no associated neurological deficit. The pain was not relieved by conservative management, including high-dose opioids. He had no underlying history of primary malignancy and no history of long-term steroid use. He had no history of chronic ailments, such as chronic kidney disease or hyperparathyroidism.

Clinically, he was a well-looking man with no stigmata of chronic disease. He was, however, in visible pain with maximal tenderness on palpation at the T12 level. There was no swelling or neurological deficit.

An initial computed tomography (CT) scan of the thoracic spine showed a moderate T12 vertebral compression fracture in a background of mild, generally reduced bone density. There was no associated posterior endplate bulge or soft tissue component to suggest a malignant fracture, and thus, this fracture was deemed probably osteoporotic as the initial laboratory workup revealed no evidence of underlying malignancy or metabolic disease. Due to financial constraints and the non-availability of the vertebroplasty kit in the country, the procedure

could only be performed 3 months after his initial consultation, at which point his procedural fluoroscopic scans showed interval development of additional mild T11, L3, and L4 compression fractures.

He underwent percutaneous vertebroplasty at T12 via a unilateral pedicular approach based on the imaging and clinical findings. Under aseptic conditions and fluoroscopic guidance, a 13 G 4-inch CONFIDENCE introducer needle (DePuy Synthes, Medos Internation SARL, Le Locle, Switzerland) was used to access the anterior T12 vertebral body via a right T12 pedicle. Approximately 4 ml of high viscosity CONFIDENCE spinal cement (DePuy Synthes, Medos Internation SARL, Le Locle, Switzerland) was then administered under intermittent fluoroscopic guidance to ensure the cement remained confined to the vertebral body. The patient tolerated the procedure well with no immediate complications. He had significant pain relief, with his pain intensity score reducing to 4/10 post-procedure. Post-procedure fluoroscopy and CT scan showed adequate filling of the T12 vertebral body with cement (Figure 1) with no extra-osseous leakage or intravasation of the cement material. Despite our patient presenting later with multiple new mild vertebral compression fractures, vertebroplasty was solely performed at the T12 vertebra level as it was the site of clinical maximal tenderness and also showed moderate height loss on imaging. No bone biopsy was done at the time of the procedure, as it would put the financial cost beyond the patient. He was discharged on the same day, 3 hours post-op. He reported significant pain relief with improved mobility at one week post-op. This improvement was maintained and continued even after his one-month follow-up review.

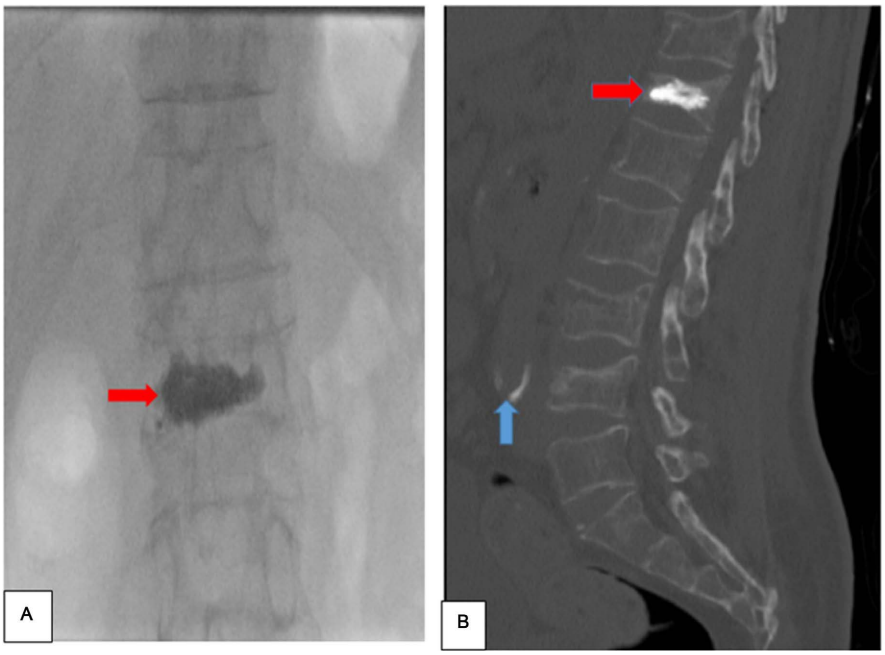

Figure 1. Post-op fluoroscopy (A) and CT scan bone window (B) of the lower thoracic and lumbosacral spine showed adequate filling of the T12 vertebral body with cement (red arrow). Mild L3 and L4 compression fractures are present. Minimal atherosclerosis of the aorta (blue arrow).

3. Literature Review and Discussion

China and the United States dominate the world's use of vertebroplasty and remain the biggest contributors to vertebroplasty research. Increasing numbers in Asia have been mainly attributed to their burgeoning osteoporosis landscape due to the rising aging population [8]. This may not be so different in Africa, as recent population studies, in countries such as Ghana, have shown an increasing life expectancy [9]. Additionally, our increasing cases of late-stage malignancies may undoubtedly contribute to a large pool of potential patients [10], with a larger socioeconomic impact due to the tendency for our malignancies to afflict younger groups. Patient selection is key as it has a direct correlation with the outcome.

In selecting patients with vertebral compression fractures for VP, a detailed history and neurologic examination are paramount [11].

Back pain was the major complaint in our patient, similar to what has been reported in several other studies [12]. Our patient reported immediate pain alleviation post-vertebroplasty, which has been the hallmark of the procedure in many cases globally [13].

Indications for percutaneous vertebroplasty include compression fractures due to primary tumors e.g. hemangioma, malignancies, e.g., metastasis, multiple myeloma, or osteoporosis; typically, with poor pain control on conservative treatment [14]. Some studies, such as the Clarke *et al.* study, on the contrary, have postulated the earlier use of vertebroplasty within weeks of the fracture without waiting for failure or conservative treatment, as it yielded better outcomes [15].

It is important for the performing physician to follow strict laid-down protocols, especially in first-time centers like ours, which may not have all the needed logistics. Preprocedural checks to rule out coagulopathies, allergies, and infections, among others, as absolute contraindications.

Many studies have demonstrated safe successful vertebroplasties on multiple levels [16]. Despite our patient's multilevel involvement, we could only tackle the T12 level due to obvious logistic constraints.

The fact remains that despite the cost-effectiveness and profound benefits that come along with VPs, they may be out of the reach of the ordinary patient, bringing to bear the glaring disparities in our healthcare system. To bring this into context, a 2017 study in the USA valued the minimum cost of VP as ten thousand US dollars and above, which could be prohibitive for a lot of patients who pay out of pocket in Ghana. The cost of the procedure was 20,000 Ghana cedis which is approximately 1800 US dollars at the time of the procedure. This is against a background of an average monthly wage of 2922 Gh cedis (266 USD) in Ghana. Considering the many benefits of the procedure and the profound benefits, greater cross-table discussion with the government and major health insurance brokers will need to be involved to bring this to the doorstep of the population.

This first case of VP in Ghana also brings into sharp focus the dearth of imaging tools for appropriate diagnosis in the form of Dual Energy X-ray Absorptiometry (DEXA) for example, which is integral to appreciate the scope of the problem.

Many studies have highlighted the need for multidisciplinary care with the use of VP, in a team that should include the neuroradiologist, endocrinologist, oncologist, and neurosurgeon, among others, to ensure an optimum continuum of care. As a novel technique for our environment, it is essential to commence modestly with a robust base. Preliminary insights derived from this foundational case suggest the need for a comprehensive framework that encompasses essential logistics and the maintenance of a resilient supply chain, alongside the requirement for suitable nursing and radiographer support, while also considering the imperative for skill transfer to enhance coverage. As we solidify the application of vertebroplasty in Ghana, we are also contemplating kyphoplasty, which offers the additional advantage of correcting vertebral body height before cement insertion and may be incorporated into our armamentarium.

4. Conclusion

This case brings to the fore the challenges of providing vertebroplasty service as a crucial pain management option in a resource-limited setting.

Informed Consent

We are grateful to our patient for consenting (informed and written) to the publication of this case, which aims to raise awareness of vertebroplasty in Ghana.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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