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Case Report

Iatrogenic calcinosis cutis: a rare diagnosis

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ABSTRACT

Calcinosis cutis involves abnormal calcium deposition in the skin and subcutaneous tissues. The iatrogenic form is rare and typically follows medical or cosmetic procedures. A 60-year-old male presented with multiple asymptomatic, skin-coloured nodules on both cheeks, present for over a decade. He had a history of autologous fat grafting for acne scars 15 years prior. Clinical examination revealed firm subcutaneous papulo-nodules. Imaging (ultrasound, X-ray, and CT scan) confirmed multiple subcutaneous calcifications. Laboratory tests, including calcium, phosphate, and vitamin D levels, were normal. Biopsy was declined. Based on the procedural history and imaging, a diagnosis of iatrogenic calcinosis cutis was made. Iatrogenic calcinosis cutis may develop following local tissue injury, as seen here with fat grafting. Fat necrosis and subsequent calcification likely contributed to the lesion formation. Imaging played a crucial role in diagnosis when biopsy was not feasible. This case highlights an unusual complication of cosmetic procedures and underscores the importance of imaging and thorough clinical evaluation in diagnosing calcinosis cutis. Awareness of such presentations helps avoid unnecessary interventions.

Keywords: Calcinosis cutis, Iatrogenic, Fat grafting, Subcutaneous nodules, Calcium deposition

INTRODUCTION

Calcinosis cutis is a condition where calcium abnormally deposits in the skin and underlying tissues.[1] The condition encompasses a range of clinical presentations, from small, localized papules and nodules to extensive lesions affecting large areas of the body, and is characterized by the formation of multiple, firm, white dermal or subcutaneous nodules due to calcium deposits.[2] Calcinosis cutis is commonly categorized into five subtypes: dystrophic, metastatic, idiopathic, iatrogenic, and calciphylaxis. Dystrophic calcinosis, the most frequent, stems from tissue injury or autoimmune diseases like systemic sclerosis.[4] Metastatic calcinosis is tied to elevated blood calcium or phosphate levels, often in kidney failure.[5] Idiopathic cases have no clear cause, while calciphylaxis, linked to severe renal disease, poses significant risks.[6] Iatrogenic calcinosis cutis, highlighted in this report, is a rare outcome of medical procedures that cause tissue damage or disrupt local calcium balance. The mechanism behind iatrogenic calcinosis involves tissue trauma from procedures like fat grafting, triggering inflammation and subsequent calcium deposition.[7,8] In fat grafting, large fat deposits may undergo central necrosis due to poor blood supply, leading to calcification. Local inflammation, driven by immune responses, further promotes crystal formation in affected tissues.[3] Epidemiologically, calcinosis cutis is rare, with iatrogenic cases being exceptionally uncommon and mostly documented in isolated reports, such as those following calcium infusions or surgical interventions.[9] While dystrophic calcinosis affects up to 25-40% of systemic sclerosis patients, iatrogenic cases lack precise prevalence data.[12] Contributing factors include repeated procedures or suboptimal techniques, which heighten tissue trauma risks.[13] Diagnosis hinges on a detailed history of prior

interventions, supported by imaging like ultrasound, X-ray, or CT to detect calcium deposits, with biopsy providing definitive confirmation when needed.[7] This case report examines iatrogenic calcinosis cutis after fat grafting, underscoring the need for thorough clinical evaluation to manage this rare complication effectively.

CASE REPORT

A 60-year-old male presented to the dermatology outpatient clinic with a long-standing history (>10 years) of multiple asymptomatic skin colored papulo nodules on both cheeks. The patient had Fitzpatrick skin type IV. There was no history of trauma, but the patient had undergone fat grafting for acne scars in both cheeks 15 years ago. The procedure was done by a plastic surgeon and there were no intra or post-operative complications. He has a medical history of type 2 diabetes mellitus, hypertension, coronary artery disease, and tobacco smoking. The patient never consulted any doctor prior to this encounter.

Upon clinical examination, the patient exhibited multiple subcutaneous, skin-coloured papules and nodules varying in size ranging from 4 to 13 mm predominantly on both cheeks. The lesions were firm, non-tender with a gritty feel on palpation.

A biopsy was recommended to confirm the diagnosis, but the patient declined because of the invasive nature of the procedure. Consequently, further investigations, including ultrasound, skull X-ray, and CT scan, were advised to confirm the clinical suspicion of calcinosis cutis. The ultrasound revealed multiple echogenic spots measuring (4 to 13 mm) with strong after shadowing in subcutaneous tissue of both cheeks with the possibility of calcified spots. As shown in Figure 1, these hyperechoic foci were distributed across both cheeks, with no evidence of abscesses or involvement of underlying muscles.

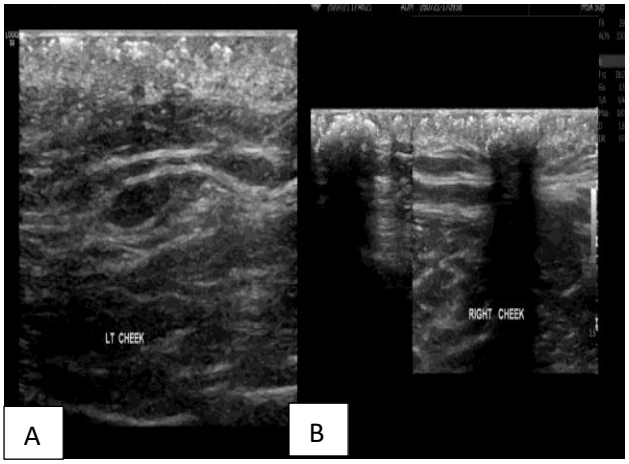

Figure 1 (A and B): Ultrasound of the left and right cheek showing multiple echogenic spots with posterior acoustic shadowing in the subcutaneous tissue.

The skull X-ray revealed irregular calcifications in the subcutaneous and soft tissue planes of the face and neck, supporting the clinical suspicion of calcinosis cutis. As depicted in Figure 2, the lateral X-ray demonstrated multiple radiopaque foci, appearing as small, irregularly shaped, bright spots scattered throughout the soft tissues. These calcifications were most prominent in the mandibular and submandibular regions, extending from the lower cheek area to the upper neck, with sizes ranging from 2 to 5 mm. The calcifications were distributed in a speckled pattern, indicating a chronic deposition process likely related to the prior fat grafting procedure. The underlying bony structures, including the mandible and cervical spine, showed no signs of erosion or involvement, and the teeth and nasal cavity appeared unremarkable, with no evidence of associated soft tissue swelling or mass effect.

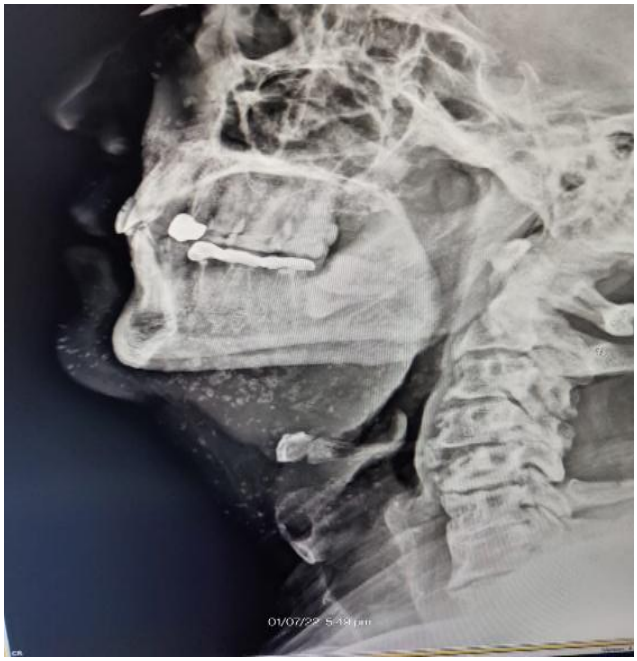

Figure 2: Lateral skull X-ray showing multiple radiopaque foci in the subcutaneous and soft tissue planes of the face and neck.

The CT scan revealed multiple high-attenuation foci in the subcutaneous tissues over the cheeks and submandibular region, consistent with calcifications. As shown in Figure 3, these calcified deposits appeared as irregularly shaped, bright spots, predominantly located in the subcutaneous planes of both cheeks, with sizes ranging from 4 to 13 mm, corroborating the ultrasound findings. The arrows in the CT image highlight the most prominent calcifications on the left and right cheeks, situated lateral to the maxillary sinuses and superior to the submandibular region. Notably, there was no evidence of surrounding soft tissue edema, mass effect, or significant inflammation, suggesting a chronic, stable process rather than an acute inflammatory response. The underlying bony structures, including the nasal cavity and

maxillary sinuses, appeared intact, with no involvement of deeper tissues or bone erosion.

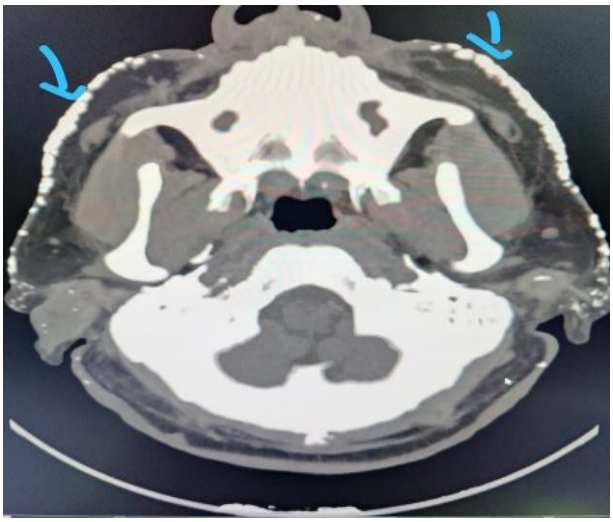

Figure 3: CT scan of the head showing high-attenuation foci (arrows) in the subcutaneous tissues of both cheeks, indicative of calcinosis cutis, with no surrounding edema or inflammation.

Laboratory tests, including blood counts, liver function, renal function, and serum calcium, phosphate, and vitamin D levels, were normal. Based on these findings, a diagnosis of subcutaneous calcified nodules, a form of iatrogenic calcinosis cutis, was made.

The patient was counselled on different treatment regimens like topical use of tacrolimus and micro-needling with radiofrequency (MNRF). The definite treatment for calcinosis cutis is surgical removal, which was also discussed with the patient. He was informed about the limited treatment options available for his condition, which is uncommon, with few studies available in the literature. Given all treatment options, he agreed to do MNRF sessions on monthly basis for six sessions. He declined surgical removal as he had fat grafting done in the past, and thought that might have led to the present condition. Furthermore, he agreed to use topical tacrolimus ointment once daily. After obtaining informed consent and clinical photographs, the treatment was commenced.

MNRF was performed on a monthly basis. Topical anesthetic cream was applied for 45 minutes prior to commencing MNRF. The depth for MNRF was 3.0 mm. Post session there was mild erythema in the treated area, which subsided over 48-72 hours. The treatment was well tolerated. Strict aseptic precautions were followed. The patient was compliant with home care daily application of tacrolimus. There were no side effects reported with its use. Smoking cessation counselling was also done.

After completion of six sessions of MNRF, patient reported a moderate improvement in his calcinosis. The post-treatment photographs were taken to compare. They showed 40% improvement in calcinosis cutis. He was again counselled on the surgical option for definitive treatment, which he declined. He was followed up for six months post procedure, after which he was lost to follow up.

DISCUSSION

Iatrogenic calcinosis cutis is a rare dermatological condition characterized by the deposition of calcium or phosphate salts in the skin or subcutaneous tissues following medical procedures.[4] First identified by Virchow in 1855, it results from the accumulation of insoluble calcium salts due to procedural interventions.[5] Unlike dystrophic calcinosis, often linked to connective tissue diseases or local tissue damage, metastatic calcinosis is associated with systemic hypercalcemia or hyperphosphatemia, while iatrogenic calcinosis cutis stems directly from medical interventions such as intravenous calcium administration or surgical procedures like autologous fat grafting.[6,7]

In the current case, the patient presented with calcinosis cutis fifteen years post-autologous fat grafting, with radiological findings confirming dystrophic calcification at the injection site. The X-ray (Figure 2) highlights a speckled pattern of calcifications in the mandibular and submandibular regions, while the CT scan (Figure 3) confirms high-attenuation foci in the cheeks, consistent with patterns described by Reiter et al.[7] This occurs when oversized fat globules lead to peripheral vascularization, while the central portion undergoes necrosis and calcifies.[3] The resulting hypoxic environment and local tissue injury trigger an inflammatory cascade, which, combined with the release of calcium-binding proteins, promotes the deposition of insoluble calcium salts in the extracellular matrix.[10] Laboratory tests revealed normal serum calcium and phosphate levels, excluding systemic metabolic disorders and supporting an iatrogenic etiology. This is consistent with a case reported by Sawke et al where a 36-year-old male developed a subcutaneous nodule in the cubital fossa following intravenous calcium-containing solutions, confirmed by cytological analysis.[9] Similarly, Sharinah et al documented iatrogenic calcinosis cutis in a new born after calcium gluconate infusion for hypocalcaemia, diagnosed via imaging and managed conservatively.[10]

Diagnosing iatrogenic calcinosis cutis requires a detailed clinical history to identify prior medical interventions, coupled with imaging techniques such as radiography, ultrasonography, or CT scans to visualize calcium deposits.[7] Skin biopsy, while occasionally necessary, may impair wound healing, as noted by Alsaif et al.[8] The diagnostic process involves ruling out systemic causes, such as those seen in metastatic calcinosis, and confirming normal serum calcium and phosphate levels, characteristic of iatrogenic and idiopathic subtypes.[6]

Treatment options for calcinosis cutis are diverse but lack universal efficacy. Surgical excision is often employed for localized lesions, though recurrence is a concern.[1] Non-invasive approaches, including laser therapy, extracorporeal shock wave lithotripsy, and medications like diltiazem, minocycline, or topical sodium thiosulfate, have shown variable success.[2,11] Recent studies highlight intralesional sodium thiosulfate as a promising treatment for superficial lesions with minimal side effects.[12] Preventive strategies, such as optimizing fat graft size or monitoring calcium infusions, are critical to reducing incidence.[13] Emerging research also explores calcium channel blockers to slow calcification progression, though evidence is limited.[11]

The pathophysiology of iatrogenic calcinosis cutis highlights the need for procedural precision to minimize tissue trauma and subsequent calcification. Ongoing research into standardized diagnostic protocols and targeted therapies is essential, as current treatments remain empirical.[2] By combining thorough clinical evaluation, advanced imaging, and tailored management, clinicians can effectively address this rare condition, improving patient outcomes.

CONCLUSION

Our case is a rare complication of medical procedures, diagnosed here through the patient's history, normal lab results, and imaging. Early recognition and exclusion of systemic causes are crucial for diagnosis and appropriate management, ranging from conservative observation to surgical intervention. This case highlights the importance of clinical vigilance and comprehensive evaluation in patients presenting with subcutaneous nodules following medical procedures.

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