Metastatic calciumphosphate deposition in the membranous nasal septum in end-stage renal disease*

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SUMMARY

Metastatic calciumphosphate depositions are a well known complication of end-stage renal disease. Numerous localisations for metastatic calcification have been described. A patient with a sub-acute swelling of the membranous nasal septum, caused by calciumphosphate depositions is presented. This is the first report of this particular localisation of metastatic calcification in end-stage renal disease.

Key words: metastatic calciumphosphate deposition, membranous nasal septum, renal disease

CASE REPORT

A thirtythree year old male with end-stage renal disease and a history of chronic renal failure, presented himself with a swelling of the anterior nasal septum. From 1983 to 1988 he was treated with chronic ambulant peritoneal dialysis, from 1988 up to the present day with hemodialysis. The hemodilutor that is used during these procedures is fragmented heparin. Between 1986 and 1989 he received three kidney transplants that were all rejected. He developed hyperparathyreoidism in 1992, for which eventually a total parathyreoidectomy was performed in 1995, after failure of initial reimplantation of one the resected parathyroid glands in the arm.

Furthermore the patient was known with tissue calcifications in the soft tissues of the upper back muscles, which remained asymptomatic. Another tissue calcification in the left shoulder caused a peri-arthritishumeroscapularis that was treated conservatively in 1997.

The swelling in the anterior nasal septum had gradually developed over the past weeks, but progressed more rapidly over the last three days.

On inspection the swelling was approximately one centimeter in diameter and involved the major part of the membranous nasal septum and columella, not affecting the cartilaginous septum (Figure 1, 2 & 3). The remainder of the nasal anthrum showed no abnormalities on both sides. Although tender on palpation, the lesion was non-fluctuating and the patient did not have a fever. Since a nasal furunkel was suspected, local application of diachylon ointment (hydrofobic ointment, ingredients: lead, arachid oil and paraffin) three times daily and intravenous administration of flucloxacillin 500mg four times daily was started.

After three days of treatment, little or no regression of the swelling was seen and the lesion was explored under local anaesthesia (lidocaine/adrenaline 1:100.000). A granular, whitish mass was evacuated along with some surrounding infected debris. Cultures of this material remained sterile.

Histopathology of the specimen showed a histiocytic and foreign-body giant cell reaction around large amounts of amorphic material (calciumphosphate) (Figure 4).

The patient made a quick recovery and was discharged shortly after the operation. Six months later follow-up showed a full recovery without any signs of newly formed deposits an the site of the previous lesion.

DISCUSSION

Calciumphosphate deposits in hemodialysis patients are a well known fenomenon and are reported in 20-100% of patients with end stage renal disease (Southwood et al., 1990). These patients often have a history of secondary hyperparathyroidism and an elevated calciumphosphorus product. The presence of metastatic calciumphosphate depositions indicates that the plasma-phosphate level exceeds the precipitation level. Apart from the plasma-phosphate level, formation of calciumphosphate deposi-

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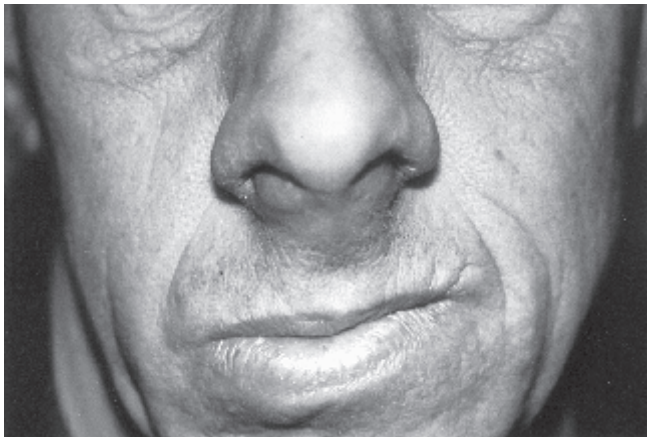

Figure 1. Clinical picture on presentation. Swelling of the anterior nasal septum. Frontal view.

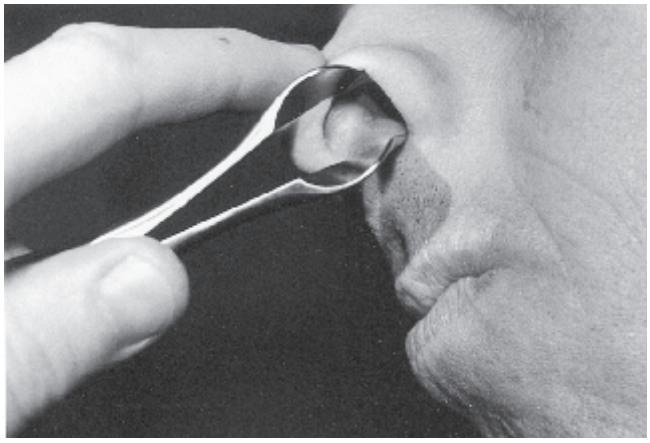

Figure 2. Clinical picture. Swelling of the anterior nasal septum. Left lateral view.

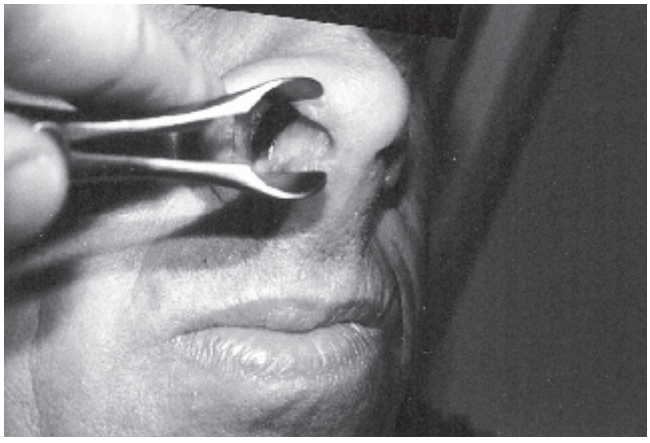

Figure 3. Clinical picture. Swelling of the anterior nasal septum. Right lateral view.

tions can also be fascillitated by local factors such as elevation of tissue pH, presence of uremic toxins and (micro-) trauma (Slatopolsky, 1989; Mitschke, 1980).

In end-stage renal disease, calcium metabolism can be disturbed and most patients are hypocalcemic (Belser et al., 1994). Phosphate clearance is reduced and plasma-phosphate levels will rise. The high phosphate levels have a lowering effect on the plasma-calcium concentration, as a result of this hypocalcemia, parathormone secretion by the pararenals will rise and the plasma-phosphate concentration will be lowered, by then the

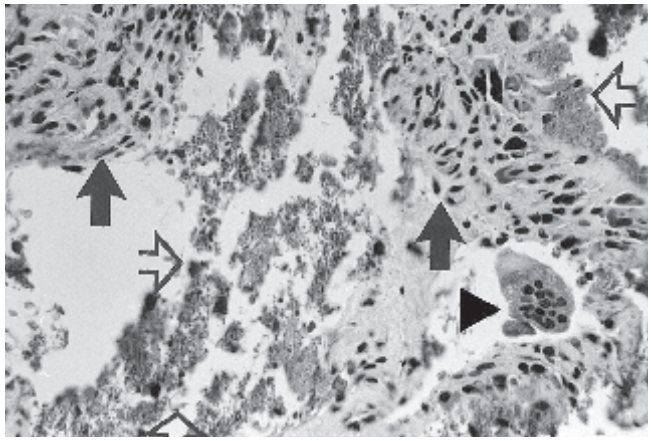

Figure 4. Histologic section of material removed at operation. Original magnification 400×. Large areas of amorphic material consisting of calciumphosphate deposits (⇦) surrounded by a inflammatory infiltrate of histiocyts (◀) and foreign body giant cells (▲)

plasma-calciumphosphate level is higher then it was before, so a higher equilibrium in the plasma calciumphosphate concentrations is reached. If the plasma-phosphate levels in this stage exceeds 2,3mmol/l (normal 0.87-1.45mmol/L), soft tissue calciumphosphate deposits will be formed.

In hemodialysis, phosphate binders are used to control hyperphosphataemia. Aluminium salts are efficient phosphate binders, but their use is associated with toxic side effects. Calcium salts are a widely used alternative, but hypercalcaemia, possibly resulting in metastatic calcification is amongst the side effects of these drugs (Hutchinson et al., 1996). Other means to control hyperparathyroidism are parathyroidectomy or administration of intravenous vitamine D (Khafif et al., 1990).

The sides of metastatic calciumphosphate deposition that have been reported are: kidneys (Howe et al, 1997), cutaneous tissues (Khafif et al., 1990), vessels (Kaneda et al., 1993), liver (Hwang et al., 1993), lungs (Hwang et al., 1993; Justrabo et al., 1979), stomach (Hwang et al., 1993), viscera (van Diemen-Steenvoorde et al.,1986), parathyroid glands (Hwang et al., 1993), myocard (Bylsma et al., 1981), dura (Ritchie et al., 1974), perineural sheaths (Paetau et al., 1976), pleura (Watanabe et al., 1983), cornea (Hanselmayer et al., 1974), conjunctiva (Hanselmayer et al., 1974), vocal cords (Belser et al., 1994), breast (Resnikoff et al., 1996) and joints (Bardin, 1994). These metastatic calcium depositions are mainly found in patients with end-stage renal disease and the reports in literature are mostly casuistic. Exact data about the prevalence of this fenomenon in the population are not at hand.

The lesions can usually be seen on a low-dosage X-ray (Resnikoff et al., 1996; Lazowski et al., 1998), bone scanning (Hwang et al., 1993) or computed tomography scans (Lazowski et al., 1998).

In this case the patient can be regarded as suffering from chronic uremia. Nasal biopsies in similar patients showed wide, thin-walled vessels in the subepithelium and stroma, due to accumulation of uremic toxins. Chronic uremia can also contibute to immunosuppression and contribute to susceptability for infections (Mitschke, 1980).

Formation of a calciumphosophate deposit and subsequent infection in our patient was probably caused by repeated microtrauma (nose picking) in the contaminated nasal vestibule. This initiated the damage to the vulnarable small vessels and collagen fibers that are present in the membranous nasal septum.
Up to now, the membranous nasal septum has never been reported as a localisation of calciumphosphate deposition in end-stage renal disease. There is however a report of a calcification of the nasal cartilage in an infant that was prenatally exposed to warfarin. It is assumed that warfarin inhibbits a vitamin K-dependent protein that prevents calcification of cartilage (Howe et al., 1997). The patient described in this case used fragmin as an anticoagulant. Fragmin is a fragmented form of heparin. Heparin does not interfere with vitamin K dependent proteins, so the "warfarin-effect" as an explanation for the calcium depositions does not apply in this case. Although our patient was at risk for developing new metastatic calcium depositions, the fact that the site of the deposition was the membranous nasal septum was a surprise. A low-dose X-ray in the lateral plane would have led to the right diagnosis earlier and hospitalisation of this patient could have been avoided. In general, imaging techniques like X-ray, bone-scanning and computer tomography can be of assistance in the diagnostic work-up of soft tissue swelling in end-stage renal disease.

CONCLUSION

In the case of a slowly progressive swelling of the membranous nasal septum in end-stage renal disease, metastatic deposition of calciumphosphate should be added to the differential diagnosis. An X-ray in the lateral plane should confirm this rare condition. Since there is no previous case described, no data concerning recurrence rates are available. In general close monitoring and subsequent treatment of serum calciumphosphate levels will diminish the risk formation of (recurrent) deposits in end-stage renal disease.

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