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TUMORAL CALCINOSIS IN A PATIENT UNDERGOING HEMODIALYSIS

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Recently, tumoral calcinosis was found in a patient who had been undergoing haemodialysis in this hospital. The tumor was partially removed and subsequently regressed. The tumoral calcinosis of hemodialysis patients seems to be different from classical tumoral calcinosis.

Key words: calcium phosphate; hemodialysis; hypercalcemia; hyperphosphatemia; surgical excision; tumoral calcinosis

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Tumoral calcinosis is a rare condition which was first reported by Inclan in 1943.

Of the 50 patients who have been dialyzed in this hospital, extraskeletal calcifications were found in only two: one was a metastatic calcification from a complication of secondary hyperparathyroidism and the other was the case reported here.

CASE REPORT

In January 1976, a tumor was discovered in the left cubital region of a 37-year-old male suffering from chronic renal failure, who had been undergoing hemodialysis twice a week since November 1974. Before the tumor was found, the patient had had repeated subcutaneous bleeding whenever the hemodialysis was performed through an inner shunt made in his left cubital region.

Prior to December 1976, the calcium content of the dialyzate was 3.5 mEq/l and of acetate 35 mEq/l; thereafter, the calcium content was reduced to 2.5 mEq/l.

The tumor grew gradually larger and finally restricted the movement of his left elbow joint. The patient was admitted to our hospital on January 6, 1977. The tumor became as large as his fist. It was elastic and tender on palpation and was not attached to the covering skin. The range of movement in the affected elbow joint was from −20 degrees extension to 100 degrees flexion and showed full pronation-supination (Figure 1).

The patient's blood was anemic and his blood chemistry showed increased urea-N, increased creatinine and decreased chlorine and sodium (Table 1).

An X-ray of the patient's left elbow showed a large tumoral calcinosis which was extraskeletal and appeared to consist of many lobules of dense material (Figure 2).

On January 10, 1977, surgical excision was attempted. The tumor was found to consist of multiple lobules which contained a milky sand-like substance. It was attached to the deep muscles and partially to the anterior capsule of the elbow joint. Complete excision could not be achieved technically. A postoperative X-ray of the patient's left elbow showed the dense tumor, largely unchanged.

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Figure 1. Large tumor at the elbow (January 6, 1977).

Figure 2. X-ray of the left elbow (January 6, 1977).

Table 1. Blood study (January 6, 1977)

R.B.C. 310 × 10/mm³	T.p.	7.2 g/dl
W.B.C. 7600/mm³	G.O.T.	23 u
Ht. 30%	G.P.T.	11 u
Hb. 8.8 g/dl	Al. ptase.	5.9 u. (K. A.)
	Before dialysis	After dialysis
Urea-N (mg/dl)	88	52
Creatinine (mg/dl)	20.1	12.0
Na (mEq/1)	134	134
K (mEq/1)	5.0	3.7
Cl (mEq/1)	97	94
Uric acid (mg/dl)	9.6	5.0

Figure 3. A new calcification in the right hip.

Figure 4. Histological findings.

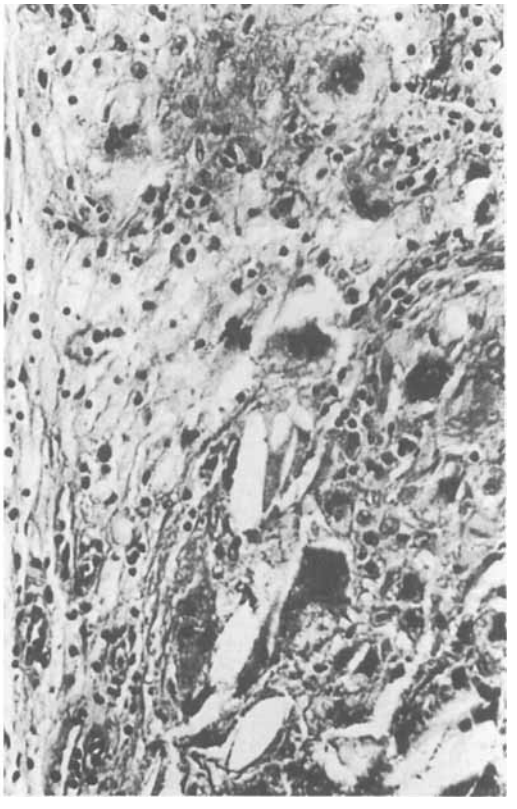

Figure 5. Histological findings.

Other new extraskeletal calcinoses were detected in the right hip and left knee of the same patient (Figure 3). However, no calcifications of the cornea, skin, blood vessels or kidneys were detected.

From histological studies, the walls of the lobules were found to consist of thick fibrous tissue, which was calcified and contained some foreign body giant cells, foam cells and small round cells (Figures 4 and 5).

By infrared absorption spectrum analysis and the X-ray diffraction techniques, the excised calcium was proved to be composed of calcium phosphate (Figure 6).

An X-ray in July 1977 showed that the calcified deposits were disappearing (Figure 7). The patient's left elbow joint regained a full range of motion.

DISCUSSION

Tumoral calcinosis was first reported by Inclan in 1943 and has since appeared in the literature from all parts of the world (Baldursson et al. 1969, Harkess & Peters 1967, Leape 1975, Morohashi et al. 1972, Sammarco & Makley 1973, Slavin et al. 1973, Thompson & Tanner 1949, Tominaga & Isobe 1974 and Ueyama et al. 1971).

In the case reported here hypercalcemia and hyperphosphatemia were always present and the calcium-to-phosphorus product was recorded as high. However, his alkaline phosphatase was always normal. There was no sub-periosteal erosion and no osteopenia. On the other hand, corneal, dermal, vascular and renal calcification were not detected. Therefore, a secondary hyperparathyroidism was excluded in this case.

In healthy adults, the product of serum calcium and serum phosphorus contents, in mg/dl, ranges from 25 to 45. In cases of chronic renal failure, the serum phosphorus

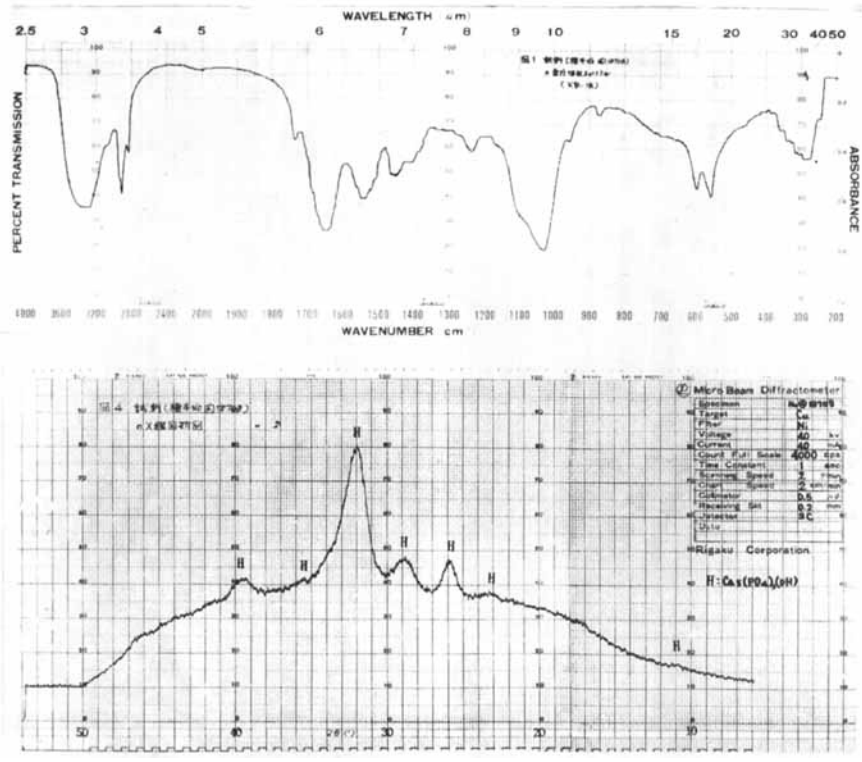

Figure 6. Data from infrared absorption spectrum analysis and the X-ray diffraction technique.

Table 2. Differences between classical tumoral calcinosis and tumoral calcinosis in hemodialysis patients

	Classical tumoral calcinosis	Tumoral calcinosis in hemodialysis patients
Age distribution	3–60 years (average; 16.7)	35–46 years (average; 40.4)
Male/Female	15/9	3/2
Normal serum Ca.	6/9 (66.7%)	None
Hypercalcemia	3/9 (33.3%)	3/4 (75%)
Normal serum P.	6/12 (50%)	None
Hyperphosphatemia	6/12 (50%)	4/4 (100%)
Normal Al. Ptase	8/11 (72.7%)	2/3 (66.7%)
Multiple/Solitary	6/13	2/3
Osteopenia	None	1/5
Renal failure	None	5/5 (100%)
Hemodialyzing period	None	3 months–6 years
Constituent	All calcium phosphate	4/5 calcium phosphate
Spontaneous remission	May be	May be

Figure 7. X-ray of the left elbow (July 1977) showing regression of the tumor.

rises, while the serum calcium may drop (Akaoka et al. 1977, Hou et al. 1976, Johnson et al. 1967 and Jowsey 1977). When the calcium-to-phosphorus product is greater than 45 mg/dl, calcium phosphate precipitates in the soft tissues (Jowsey 1977).

Recently, hemodialysis for chronic renal failure has become widespread. Tumoral calcinoses of hemodialysis patients (Akaoka et al. 1977, Hou et al. 1976, Johnson et al. 1967 and Jowsey 1977) seems to be different from classical tumoral calcinoses as defined by Harkness (1967). In Table 2 the main differences between classical tumoral calcinosis and that following hemodialysis, as reported in the literature, are shown. These unusual tumoral calcinoses may increase in the future.

Although spontaneous disappearance of the tumor had also been reported, revising the prescription for the dialyzate and surgical excision of the tumor may be necessary. However, a complete excision is a difficult procedure.

REFERENCES

Akaoka, K., Terayama, K. & Watanabe, S. (1977) Tumoral calcinosis at the shoulder in a hemodialyzing patient. *Kanto Seisai Shi* **8,** 12–17.

Baldursson, H., Evans, E. B., Dodge, W. F. & Jackson, W. T. (1969) Tumoral calcinosis with hyperphosphatemia. *J. Bone J. Surg.* **51**-A, 913–924.

Harkess, J. W. & Peters, H. J. (1967) Tumoral calcinosis. *J. Bone J. Surg.* **49**-A, 721–731.

Hou, K., Kaneda, H., Haruyama, T. & Tabata, S. (1976) Large metastatic calcification in a hemodialyzing patient. *Bone Metabolism* **9,** 52–55.

Inclan, A. (1943) Tumoral calcinosis. *J. Amer. med. Ass.* **121,** 490–495.

Johnson, C., Graham, C. B. & Curtis, F. K. B. (1967) Roentgenographic manifestations of chronic renal disease treated by periodic hemodialysis. *Amer. J. Roentgenol.* **101,** 915–926.

Jowsey, J. (1977) *Metabolic diseases of bone.* pp. 243–244 and 282. W. B. Saunders Co., Philadelphia.

Leape, L. L. (1975) Calcification of the leg after calcium infusion. *J. Pediat. Surg.* **10,** 831–834.

Morohashi, M., Ito, H., Kikuchi, S. & Miyamoto, F. (1972) A case of tumoral calcinosis. *Tohoku Seikei Saigai Geka Kiyo* **15,** 229–235.

Sammarco, G. J. & Makley, J. T. (1973) Tumoral calcinosis and mongolism. *Clin. Orthop.* **91,** 164–168.

Slavin, G., Klenerman, L., Darby, A. & Bansal, S. (1973) Tumoral calcinosis in England. *Brit. med. J.* **20,** 147–149.

Thompson, J. E. M. & Tanner, F. H. (1949) Tumoral calcinosis. *J. Bone J. Surg.* **31**-A, 132–140.

Tominaga, S. & Isobe, T. (1974) On tumoral calcinosis. *Rinsho Seikei Geka* **9,** 787–791.

Ueyama, H., Ijichi, M. & Abe, M. (1971) A case of tumoral calcinosis. *Kanto Sei Sai Shi* **2,** 33–36.

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