Complication of Long-Term Hemodialysis – Secondary Hyperparathyroidism

Patient Mr. Chen, 40-year-old male, has received long-term hemodialysis for five years due to his uremia. The patient is tall and strong with good appetites. He never follows the instructions to take the phosphate-binding agent with meals; therefore his blood phosphate level tends to be high. Recent years, the patient started feeling bone pains, fingers numbs (difficult to move), and joints stiff all over the body. He felt pain whenever moved his body, and gradually, he couldn't straight up. His body became stiff with a worsening bone pain, which relied on painkillers to control. Unfortunately, he suffered a gastric bleeding and was being sent to the hospital for further exam.

Blood tests revealed that phosphate and calcium were high; X-ray showed multi-calcification. The endoscopes observed a calcified object in the patient's stomach. Parathyroid hormone level in blood was quite high. The patient was diagnosed with uremia with complication of secondary Hyperparathyroidism. The neck ultrasound also found 4 swollen parathyroid glands. We consulted general surgeon for parathyroidectomy. After two months, all above-mentioned symptoms were gone, and no calcified soft tissue was observed on X-ray. The patient is still on the regular hemodialysis treatment. Having learned from the lessons mentioned above, the patient now complies with instructions and medical orders.

Parathyroid is located on the neck, behind the thyroid. The normal size of parathyroid is like rice, two of each side, and hardly to be found by general ultrasound. Secondary hyperparathyroidism is not caused by the malfunction of parathyroid; it is due to other factors that lead an increase production of parathyroid hormones, which proliferates parathyroid cells, and makes the size 10 to 50 times of the normal. Patients with uremia are having hypocalcaemia, Vitamin D deficiency, hyperphosphatemia at the same time that trigger the increase of parathyroid hormones. Ever since it became well-known that patients with uremia may have complication of hyperparathyroidism, and lead to renal osteodystrophy, a variety of management strategies have been available to control the secretion of parathyroid hormones, **including phosphate-binding agent with meals , high-calcium hemodialysis.or high-vitamin D supplement.** However, one important factor that has been missing is control the level of phosphate. One of the factors that trigger the increase of parathyroid hormones in patients with uremia is high level of blood phosphate. In normal person, high level of phosphate stimulates the secretion of parathyroid hormones. The hormones stimulate the kidney to remove phosphate until the phosphate level returns to normal. However, the kidneys of patients with uremia are not able to carry out the function of phosphate removing; the phosphate level remains high and continuously stimulate parathyroid, which lead parathyroid proliferation and increase the secretion of parathyroid hormones. The negative feedback results in secondary

hyperparathyroidism. Hypocalcaemia and vitamin D deficiency are also important factors, of course.

Secondary hyperparathyroidism is a systemic disease which damage many systems. For instance of muscleskeleton system, the symptoms are: osteodystrophy (osteo membrane dissolve, bone cyst, osteo fibrosis), and lead to bone pain, bone fractures, growth and development delay. Calcification of soft tissue leads muscle **disnormal**, tendon broken, soft tissue necrosis, vessel calcification and necrosis, skin itch, and so on.

Along with the advance of dialysis machine and improvement of medical care, the duration of long-term hemodialysis is prolonged. Patients on hemodialysis more than 10 years are more likely to suffer this complication. The complication due to long-term hemodialysis should be closely monitored. As mentioned above, secondary hyperparathyroidism causes renal osteodystrophy with the consequences impacts on the quality of life. Hence, we should aggressively prevent the occurrence. First of all, starts from eating food with less phosphate. However, phosphate is the essential component of proteins, and all meat contains high level of phosphate. In order to balance the protein intake and reduce phosphate absorption, taking phosphate-binding agent with meals is a must. The agent binds with phosphate in food, reduces the absorption, and maintains the blood phosphate within the normal level. When the level of parathyroid hormone is high, increase the intake of calcium or vitamin D to inhibit the secretion of parathyroid hormones.

Patients on long-term hemodialysis should check calcium and phosphate on a monthly basis, and check the level of parathyroid hormones every six months. When hyperparathyroidism is suspect, neck ultrasound on parathyroid should be done. If any of followings occurs, parathyroidectomy should be considered:

1. High level of parathyroid hormones combines with sustained hypocalcaemia; the skin itch won’t go away after hemodialysis.
2. Significant soft tissue calcification (particularly for blood vessels) and X-ray findings which conservative therapy couldn’t control.
3. Soft tissue ischemia with acute ulcer and necrosis

Parathyroidectomy is a skillful surgery. Performed by an experienced surgeon usually brings a good outcome. In the past years, the conditions of patients gain better after the surgery. However, if the patient is with uremia, the above-mentioned control measures for calcium and phosphate should be practice constantly to avoid reoccurrence.