



Shaping Tomorrow's Nephrology: Insight-Driven Kidney Care

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## **Early Changes in Mineral Metabolism and Bone Health After Kidney Transplantation: A One-Year Retrospective Analysis**

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**Objectives :** Chronic kidney disease mineral and bone disorder (CKD-MBD) increases fracture risk in kidney transplant recipients (KTRs). Understanding post-transplant changes in mineral metabolism and skeletal health is essential for management.

**Methods :** This retrospective study included 20 patients who underwent kidney transplantation between August 2021 and April 2024. Bone mineral density (BMD) and trabecular bone score (TBS) were measured by dual-energy X-ray absorptiometry. Serum parameters included calcium, phosphorus, vitamin D, intact parathyroid hormone (PTH), C-terminal telopeptide of type I collagen (CTx), and procollagen type 1 N-terminal propeptide (P1NP). Parameters before and after transplantation were compared using paired t-test.

**Results :** Mean age was  $56.5 \pm 9.9$  years, and 55.0% were male. After 12 months, calcium increased ( $9.06 \pm 1.14$  to  $10.03 \pm 0.63$  mg/dL), phosphorus decreased ( $6.02 \pm 1.84$  to  $3.51 \pm 0.55$  mg/dL), and intact PTH declined by 65.3% ( $287.03 \pm 218.09$  to  $99.44 \pm 91.80$  pg/mL, all  $p < 0.001$ ). CTx decreased by 48.8% ( $p = 0.006$ ) and P1NP by 67.8% ( $p = 0.029$ ). Femoral neck BMD T-score decreased ( $-1.14 \pm 1.09$  to  $-1.51 \pm 0.97$ ,  $p = 0.010$ ), while spine BMD and TBS showed no significant changes.

**Conclusions :** Within the first year after transplant, KTRs showed biochemical normalization of mineral metabolism, reduced bone turnover, preserved trabecular bone quality and spine BMD, and mild femoral bone loss, consistent with early skeletal adaptation. Long-term monitoring is warranted.

Figure1\_Early Changes in Mineral Metabolism and Bone Health After Kidney Transplantation A One-Year Retrospective Analysis.png



**Figure 1. Changes in CKD-MBD Parameters, BMD, and TBS after Kidney Transplantation**

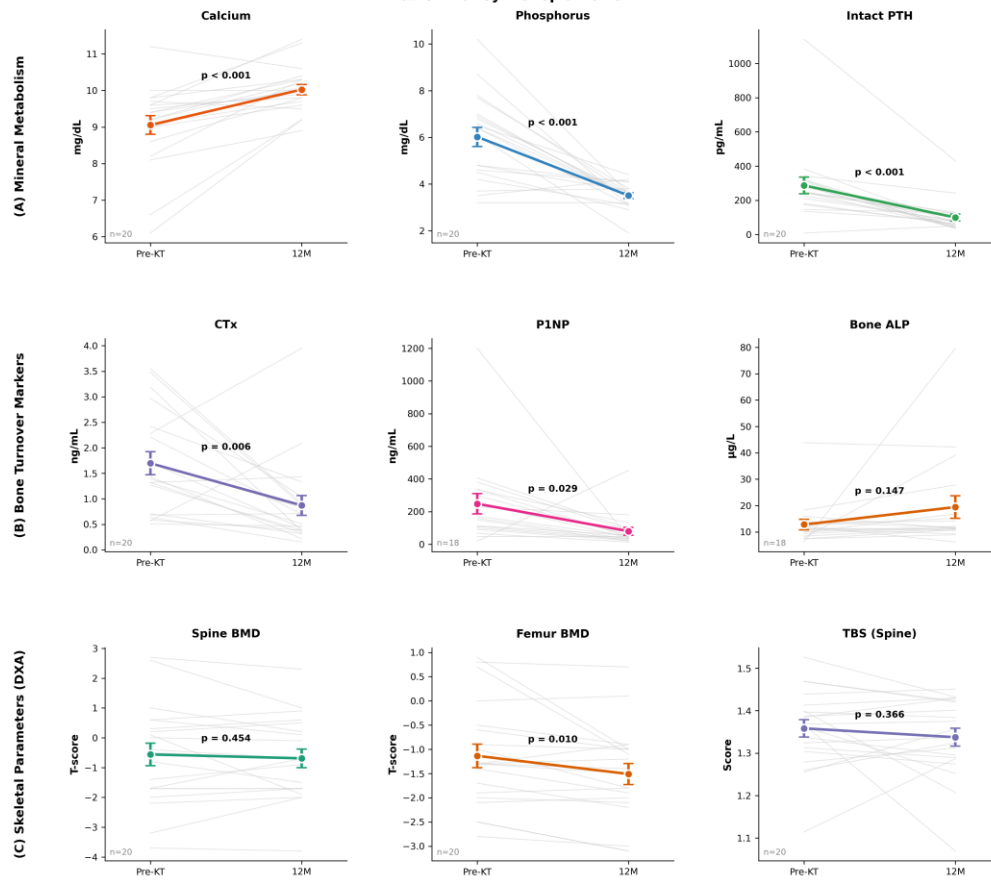


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**Table 1.** Changes in CKD-MBD Parameters and Bone Mineral Density at 12 Months after Kidney Transplantation

| Variables                    | Baseline        | 12 Months      | Change  | %<br>Change | P-value |
|------------------------------|-----------------|----------------|---------|-------------|---------|
| <b>Mineral metabolism</b>    |                 |                |         |             |         |
| Calcium (mg/dL)              | 9.06 ± 1.14     | 10.03 ± 0.63   | 0.97    | 10.7%       | <0.001  |
| Phosphorus (mg/dL)           | 6.02 ± 1.84     | 3.51 ± 0.55    | -2.51   | -41.7%      | <0.001  |
| iPTH (pg/mL)                 | 287.03 ± 218.09 | 99.44 ± 91.80  | -187.59 | -65.4%      | <0.001  |
| Vitamin D (ng/mL)            | 14.88 ± 9.45    | 14.85 ± 6.82   | -0.03   | -0.2%       | 0.989   |
| <b>Bone Turnover Markers</b> |                 |                |         |             |         |
| ALP (IU/L)                   | 71.6 ± 33.5     | 87.1 ± 62.3    | 15.50   | 21.6%       | 0.268   |
| Bone ALP (µg/L)              | 12.80 ± 8.35    | 19.44 ± 18.10  | 6.64    | 51.9%       | 0.147   |
| CTx (ng/mL)                  | 1.70 ± 1.01     | 0.87 ± 0.87    | -0.83   | -48.8%      | 0.006   |
| P1NP (ng/mL)                 | 247.89 ± 265.67 | 79.82 ± 101.97 | -168.07 | -67.8%      | 0.029   |
| <b>Bone Mineral Density</b>  |                 |                |         |             |         |
| BMD Spine T-score            | -0.56 ± 1.69    | -0.69 ± 1.40   | -0.13   | 23.2%       | 0.454   |
| BMD Femur T-score            | -1.14 ± 1.09    | -1.51 ± 0.97   | -0.37   | 32.5%       | 0.010   |
| TBS (Spine)                  | 1.36 ± 0.09     | 1.34 ± 0.09    | -0.02   | -1.5%       | 0.366   |

Data are presented as mean ± standard deviation. P-values were calculated using paired t-test.

Abbreviations: ALP, alkaline phosphatase; BMD, bone mineral density; CTx, C-terminal telopeptide of type I collagen; iPTH, intact parathyroid hormone; P1NP, procollagen type I N-terminal propeptide; TBS, trabecular bone score.