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## Renal dysfunction due to nephrectomy and radiotherapy and chemotherapy treatment of Wilms tumor

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Νεφρική δυσλειτουργία λόγω νεφρεκτομής, ακτινοθεραπείας και χημειοθεραπείας για την αντιμετώπιση του όγκου Wilms

Περίληψη στο τέλος του άρθρου

**Key words:** Chemotherapy, Radiotherapy, Renal dysfunction, Wilms tumor

Wilms tumor (WT) is the most common malignant renal tumor in childhood. It accounts for about 7% of all pediatric cancers. Significant success has been achieved in treatment the disease with a multidisciplinary approach and advanced methods, and the survival rate, that was less than 30% in the 1930s, has reached about 90% today. Currently, in large treatment centers, WT is treated according to treatment protocols that are standardized, in order to keep morbidity and late side effects at the lowest levels, without decreasing the survival rates. A combination of induction chemotherapy (CT), nephrectomy, postoperative CT and, in some cases, radiotherapy (RT) is used.<sup>1-3</sup>

Although WT is a very sensitive tumor to RT, indications for its use have decreased over time, because of the late side effects after application to young children. With the improvement in efficient CT combinations and preoperative CT application, RT is no longer needed in many patients. RT to the tumor bed is recommended for

all phase III cases with benign histology and phase II–IV cases with malignant histology.<sup>3-5</sup>

In patients with WT, in addition to the late systemic effects of treatment, renal problems that may occur as a result of nephrectomy may emerge during follow-up. In the long-term monitoring of patients who have undergone nephrectomy for WT, compensatory hypertrophy is observed in the remaining kidney. When the studies on renal function during the long-term monitoring of these patients for up to 20 years after treatment termination are reviewed, it has been determined that subclinical problems, such as proteinuria and a decrease in glomerular filtration rate (GFR) can emerge in the long-term, although the risk of developing end stage renal failure is low.<sup>6,7</sup> In the study of Mavinkurve-Goothuis and colleagues, the patients who underwent nephrectomy for WT or other reasons were divided into two groups and compared in terms of GFR and blood pressure. While the patients in the WT group followed-up for 15 years showed signs of renal injury at the rate of 23%, a significantly lower rate was observed ( $p=0.004$ ) in the other group.<sup>4</sup>

Studies have shown that various risk factors, such as surgery, CT dose and type, and RT are associated with impaired renal function in patients with WT. De Graaf and colleagues evaluated 41 patients undergoing unilateral nephrectomy and 41 patients with WT, divided into two groups, according to treatment with CT or CT+RT, in terms of GFR. GFR was found to be 96.4% and 72.7%, respectively in the CT and CT+RT groups. The authors stated that combined treatment caused greater decrease in GFR.<sup>3</sup> It has been reported that renal dysfunction is more common in CT regimens using cyclophosphamide and carboplatin.<sup>5</sup> The largest study that has been conducted on long-term renal function in patients with WT is that of Breslow and colleagues.<sup>7</sup> In that study, 5,910 patients monitored after treatment of WT were evaluated in terms of end-stage

renal failure, at the stage of dialysis or kidney transplant necessity. The development rate of end-stage renal failure (renal damage longer than 3 months or GFR <60 mL/min/1.73 m<sup>2</sup> decrease) was 0.006%.<sup>7</sup>

Various different markers have been screened for use for the evaluation of renal function after the treatment of patients with WT. Markers indicative of tubular function, such as cystatin c, N-acetyl-beta-glucosaminidase, urinary endothelin-1 and β2 microglobulin were screened, but no significant change was observed in any of these possible markers.<sup>1,6,8</sup> Another study concluded that even if the patients treated for WT had no symptoms, they should be evaluated, not only by routine renal function tests and GFR in the late period, but also by detailed renal ultrasonography, urine sediment analysis, the presence of urinary albumin and beta-2-microglobulin excretion, and the problematic patients should be followed-up nephrologically.<sup>1</sup>

As a consequence, since more efficient treatment options have been developed for WT, the quality of life of the treated patients has been improving with time, and survival rates have been increasing. Because of the high success in the treatment and the long life expectancy of children with WT, the monitoring of the renal problems that can occur following nephrectomy becomes much more important. A specific marker that can be used to evaluate renal function in this population has not yet been determined. In WT follow-up, patients should be evaluated not only with routine renal function tests but also in terms of detailed renal ultrasonography, urinalysis and tubular function.

## ΠΕΡΙΛΗΨΗ

### Νεφρική δυσλειτουργία λόγω νεφρεκτομής, ακτινοθεραπείας και χημειοθεραπείας για την αντιμετώπιση του όγκου Wilms

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Επειδή έχουν εφαρμοστεί περισσότερο αποτελεσματικές επιλογές θεραπείας στον όγκο Wilms (WT), ο ρυθμός ζωής των ασθενών βελτιώνεται ημέρα με την ημέρα και αυξάνονται τα ποσοστά επιβίωσης. Λόγω του μακροχρόνιου

προσδόκιμου ζωής των παιδιών, είναι πολύ σημαντική η παρακολούθηση των νεφρικών προβλημάτων που μπορεί να προκύψουν λόγω της νεφρεκτομής. Ακόμη δεν έχει προσδιοριστεί ένας καλός δείκτης για την αξιολόγηση των νεφρικών λειτουργιών. Κατά την πορεία του WT, οι ασθενείς θα πρέπει να αξιολογούνται όχι μόνο για τις συνήθεις νεφρικές λειτουργίες, αλλά και με εφαρμογή λεπτομερούς υπερηχογραφίας νεφρού, σωληναριακών λειτουργιών και λειτουργιών ούρησης.

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Λέξεις ευρητηρίου: Ακτινοθεραπεία, Νεφρική δυσλειτουργία, Όγκος Wilms, Χημειοθεραπεία

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