

THESIS FOR PH.D. DEGREE

**DIAGNOSIS AND TREATMENT OF
PROSTATE CANCER**

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INTRODUCTION

Among the malignant tumors, the prostate cancer takes a high place worldwide. The incidence and mortality of the disease show big geographical differences.

The increase of incidence started from the 1980s. This rapid increasing is due to the extensive spread of determination of prostatic specific antigen (PSA).

In 1999 Hungary was in the third place in Europe regarding the mortality of prostate cancer. As a cause of death in men dead with malignancy, the prostate cancer is the third one.

Generally the prostate cancer is a disease of the old population. The newly diagnosed patients are over 65 years. Thanks to screening programmes, the prostate cancer becomes the disease of middle ages as well. Oppositely to decreasing of the incidence in the old ages, there is a continuous increasing in the 50-59 years old population.

The second impact of screening programmes is the stage migration at the time of discovery of the tumor. The rate of advanced tumors at the time of discovery decreases, at the same time the rate of organ confined cancer increases together with the rate of radical prostatectomy (RP).

In my dissertation I prove the importantness of introduction of new diagnostic methods for early detection of the cancer and the advantages of the minimally invasive radical intervention. The new diagnostic and therapeutic activities, that nationwide prominently performed in our department, are largely assisting the safe and effective treatment of the patients.

AIMS OF THE STUDY

1. To quest patients with prostate cancer in the East of Hungary.
2. Introduction of new radiological and functional imaging methods.
3. Use of positron emission tomography (PET) for the early detection of prostate cancer and evaluate its role in the decreasing of false negative biopsies and in the increasing of the positive biopsies.
4. Use of endorectal magnetic resonance imaging (EMR) as a new diagnostic method for preoperative staging determination.
5. To evaluate the characteristics of prostate cancer in patients with negative PSA and prove the importance of the urological investigation in the screening of prostate cancer.
6. Use the advantage of the minimally invasive laparoscopy (LAP) in determination of stage of the cancer by laparoscopic lymph node dissection.
7. Evaluate the early results and prognosis of radical prostatectomy as a method of choice for the treatment of organ confined prostate cancer.
8. To prove the role of prostate cancer as a possible cause of some immunological diseases, as well as the role of its radical treatment to improve the quality of life.

PATIENTS AND METHODS

The detection of prostate cancer, prostate biopsy

Between January 1996 and December 2004 we performed 1572 prostate biopsy on 1348 patients because of suspicion of prostate cancer. The average age was 68 years (32-98), the average PSA was 32 ng/ml (0,02-5169).

According to the positive biopsies (542) PSA values the patients were assorted in three groups: group I: patients with PSA level under 10 ng/ml (145 patients); group II: patients with PSA level between 10 and 20 ng/ml (115); group III: patients with PSA over 20 ng/ml (188). In 94 patients the PSA was unknown.

Detection of prostate cancer with normal serum PSA level (≤ 4 ng/ml)

Between January 1, 1996 and December 31, 2003, we performed transrectal needle biopsy in 82 patients with PSA ≤ 4 ng/ml. The patients' average age was 63 years (43-82). The average PSA was 2.57 ng/ml (0,02-4). In 46 patients (56%) the indication of biopsy was the positive digital rectal examination. In the remaining cases the indication of biopsy was the low free/total (F/T) PSA rate in 20 patients (24%), in one patient the change in PSA velocity, in one patient the positive familial history, in another case the suspicion (high grade of intraepithelial neoplasia PIN) in the previous histological examination in the specimen of transurethral resection of the prostate (TURP). In 13 cases (16%) other causes were the indication of biopsy.

Among the 82 patients 17 underwent radical perineal prostatectomy (RPP). Their average age was 60 years (46-74), their average PSA was 2.6 ng/ml (1.07-4). The preoperative staging examinations (transrectal ultrasonography /TRUS/, computed tomography /CT/, bone scan, cystoscopy) were negative.

Use of PET to increase the rate of positive biopsies

Using the [^{11}C]-methionin (MET) we evaluate the role of positron emission tomography in detection of early prostate cancer. With MET-PET we looked for tumor-suspected areas in the prostate.

Between December, 2001 and April, 2003, 20 patients were included in the study. Because of elevated PSA value, all the patients underwent one or more transrectal prostate biopsy. The patients' average age was 65 years (52-75), the average PSA was 9.36 ng/ml (3.49-28.6). MRI and dynamic MET-PET were performed for each patient. Multiple biopsies were taken from the suspected areas that were shown in the MRI-MET-PET.

Use of sensitivity and specificity of CT scan in the determination of stage of the prostate cancer

Between January 1, 2000 and September 30, 2003 CT scan was performed for 160 patients as a part of preoperative stage determination before RPP. The patients' average age was 64 years (45-77). We evaluate the sensitivity of CT scan in correlation with the prognostic factors (PSA, Gleason grade). Statistical analysis was made with paired t-test and Mann-Witney U-test. $P < 0.05$ was considered as clinically significant. The correlation was calculated with Pearson coefficient.

Use of endorectal MRI for determination of the stage of prostate cancer

Between May, 2004 and February 2005, EMR was performed for 23 patients having histologically proved prostate cancer on the aim of stage determination. The average age of the patients was 67 years (51-76), the average of serum PSA level was 19.9 ng/ml (3.95-122), average of F/T PSA rate was 0.096 (0.036-0.17).

RP was performed for 14 patients (14/23). LAP-RP was performed for 12 patients, while 2 patients underwent RPP. During the histological examination of the specimens the

localization of the tumor was determined and compared with localization of the tumor in the EMR.

Surgical treatment of prostate cancer, radical prostatectomy

Between December 1996 and December 2004, we performed 311 radical prostatectomy because of histologically proved prostate cancer. There were 291 RPP and 20 LAP-RP in Hungary firstly performed in our department. The patients' average age was 64 years (45-80). The average PSA value was 19.99 ng/ml (1.07-444) in RPP group and 11.75 ng/ml (0.96-68) in LAP-RP group. CT and bone scan was performed for 248 and 236 patients respectively. 12 laparoscopic and 4 open pelvinal lymph node dissection were done. Results and prognosis were evaluated during the postoperative short-term follow-up.

Detection of prostate cancer, that caused paraneoplastic symptoms. Myositis

The cause of some of the autoimmune diseases may be a malignant tumor. If the tumor is eradicated the symptoms may disappeared and the patient may cured from the autoimmune disease totally. In our practice we met with 56 years old male patient, who had dermatomyositis. By physical examination there was suspicion for prostate cancer, which was proven by biopsy. The patient underwent RPP.

RESULTS

The detection of prostate cancer, prostate biopsy

Between January 1996 and December 2004 we performed 1572 prostate biopsy because of suspicion of prostate cancer. During the mentioned period the number of biopsies and detected tumors were increased 5 times and 2.5 times respectively.

According to the positive biopsies, PSA values the patients were assorted in groups: group I: patients with PSA level under 10 ng/ml (32%), 45% of them underwent RP; group

II: patients with PSA level between 10 and 20 ng/ml (26%), 43% of them underwent RP;
group III: patients with PSA over 20 ng/ml (42%). The majority of patients in this group have got palliative treatment. Only 14% under went RP.

Detection of prostate cancer with normal serum PSA level (≤ 4 ng/ml)

We performed biopsy in 82 patients with PSA ≤ 4 ng/ml. The prostate cancer was proved in 17 cases. In one case the tumor was undifferentiated (Gleason score >7), the tumor was moderately differentiated in 6 cases (Gleason score 5-7) and in 8 cases the tumor was well differentiated (Gleason score 2-4). In two cases the grade wasn't given (Gx).

According to the histological examination, among the 17 patients that underwent radical prostatectomy, 10 patients had organ confined, 6 patients had locally advanced tumor and for one patient the stage wasn't given. Among the 10 patients, 5 patients had well, 3 patients had moderately and 2 patients had poorly differentiated tumor. Among the 6 patients, one patient had well (Gleason score 3), 3 patients had moderately and 2 patients had poorly differentiated tumor.

Use of PET to increase the rate of positive biopsies

15 of 20 patients had suspect accumulation (SA) in the prostate. Both PET positive and PET negative patients underwent prostate biopsy. Out of the 15 patients who had SA in the prostate, the repeated biopsy proved carcinoma in 7 cases (46.7%).

There was no patient who had positive histology and negative PET examination. The overall detection rate was 35% (7/20) and 46.7% (7/15) in the whole group and the PET-positive group, respectively. As far as we know, ours has been the only reported series so far.

Use of sensitivity and specificity of CT scan in the determination of stage of the prostate cancer

Sensitivity and specificity of computer tomography (CT) for extracapsular invasion were 14% and 98%, for infiltration of seminal vesicular 12% and 100% and for bladder

infiltration 20% and 97% respectively. There was not significant difference between the prostate specific antigen values ($p=0,94$) in the case when the tumour was confined to the prostate and when the cancer showed extraprostatic infiltration. There was significant difference between the Gleason score values in the two groups respectively ($p=0.008$).

Use of endorectal MRI for determination of the stage of prostate cancer

6 of 23 cases extracapsular invasion and 3 of 23 cases seminal vesicular tumour infiltration were described by the EMR. In two further cases the examination showed suspicious tumour spreading along the neuro-vascular pedicles.

The histological examination of the specimens of RPP ($n=14$) showed 5 and 9 organ confined and locally advanced disease respectively.

On the whole in 10 cases the histological results and EMR findings were identical regarding the tumour stage. In two cases the EMR showed false positive and in another two cases false negative results.

Surgical treatment of prostate cancer, radical prostatectomy

In the period of 1996-2004 there were 291 radical perineal and 20 laparoscopic extraperitoneal radical prostatectomies in our department.

In the group of patients with pT1 disease ($n=25$) there were PSA relapse in two cases. During the examined period in one case we started adjuvant treatment.

In the group of patients with pT2 disease ($n=166$) there were need to start adjuvant hormonal therapy in 18 cases, while in 4 patients irradiation therapy were performed.

In the group of patients with pT3 disease ($n=51$) on the whole of 21 patients need for adjuvant therapy. In 12 cases hormonal, in 3 cases irradiation and in 6 cases combination of hormonal and irradiation therapy were started.

In the group of patients with pT4 disease ($n=26$) during the period of the study in 19 patients started adjuvant treatment.

The histological evaluation of the RPP specimens in 33 cases was not suitable for determining of pathological stage. In this group in 8 cases continuous and in 3 cases intermittent hormonal therapy is running.

In 10 cases the histological process was not able to find malignant tissue in the specimens of RPP (T0 disease). 8 of 10 patients had a preoperative hormonal treatment before the radical operation. Despite the lack of the malignant tissue, in two cases adjuvant therapy started because of PSA relapse.

Lymphadenectomy

In 16 patients preoperative pelvic lymphadenectomy were performed. The histological examination showed metastasis in 7 cases in the picked up lymph nodes. In the rest of 9 patients, who proved to be metastasis negative, there were 6 organ confined and 3 locally advanced tumour after the RPP.

Complications

In our series, the two most frequent complication of RPP were the perineal fistula and the rectal injury. In the majority of these complications were treated conservatively (prolonged catheterization, intraoperative suturing of rectal wall). Only one patient needed colostomy, because of sustained rectal fistula.

In the early postoperative period there were two patients who were revised because of postoperative bleeding. Bladder neck injury in four, and ureteric injury in two cases happened. In the latter two cases double J ureteric stenting was enough for the recovery.

Among the late complications middle or severe incontinence were noticed in 34 cases, while stricture of the vesicourethral anastomosis were revealed in further 8 cases.

Myositis

Our prostate cancer patient with the severe symptoms of dermatomyositis underwent radical perineal prostatectomy. The histological process showed a well differentiated Grade 1, pT1 tumour in the right lobe of the prostate.

DISCUSSION

The prognosis and chance of curative treatment of the organ confined prostate cancer is much better. The aim of introducing more and more new diagnostic methods are to improve the detection rate of early cases and to decrease the unnecessary suffer of patients from steps of the diagnostic cascade.

Detection of prostate cancer with normal serum PSA level (≤ 4 ng/ml)

To find prostate cancer patients who had normal ≤ 4 ng/ml sera PSA level is a great challenge. There is always a question, whether these cancers are significant or not, do they cause any harm for the patients or not in their life. The differentiation between the significant and not significant cancers according to the histological results of prostate biopsy is a great deal. The most important aspects which are described are the followings: the number of the positive cores, the length of the cancerous part in the core and the grade of the tumour. According to the tumour size and grade in the specimens of RPP we can also distinguish significant or not significant cancers (tumour volume $< 0,5$ ml, Gleason score ≤ 7 : not significant). In the literature there is a wide range of occurrence of significant tumour (17-90%) in case of PSA is less than 4 ng/ml.

Carter and co. emphasize that the more accurate quest after prostate cancer in case of normal PSA would be imperative in early ages.

To take into account of tumour volume and Gleason score there were 8 of 17 significant cancers among the patients who underwent prostate biopsy. In the series of RPP there were 10 of 17 patients who had finally significant cancer.

The ratio of significant cancers is high in the group of patients with positive biopsy and even more in the group of RPP. These data are support the importance of investigation of patients in case of normal sera PSA level. In the establishment of indication of prostate biopsy we should consider more aspects which improve the detection rate of prostate cancer.

Use of PET to increase the rate of positive biopsies

Several methods have been established to improve the detection rate of biopsies in case of suspected prostate cancer. PET examination is a relatively new, functional imaging method used in the diagnosis, staging, and therapy-monitoring of various cancers. Since biochemical alterations appear earlier than anatomical structural changes, PET can reveal pathological alterations much earlier and with higher sensitivity. At this point, an essential task is to find an adequately specific radiopharmaceutical for mapping.

The first data about using MET in the follow-up of prostate cancer patients were published by Nilsson et al. In the study of Nunez et al., consecutive FDG and MET PET-scans were performed in patients with newly progressive metastatic prostate cancer. The sensitivity of FDG- PET was 48%, while it was 72% for that of MET-PET. MET-PET identified significantly more lesions than FDG-PET.

Our study was the first to use MET-PET in the early detection of organ-confined prostate cancer. In BPH or in inflammatory lesions, the expected amount of methionine-accumulation is much lower than in tumorous lesions. By sampling only the most suspicious area of the prostate, we were able to reach higher detection rate (46%) than that reported in connection with repeated untargeted multicore biopsies. Our data suggest that primary prostate cancers as small as 0.5 cm in largest diameter may be detected with MET-PET if the

accumulation of the tracer is high enough in the lesion. We can conclude that MET-PET with short dynamic scanning and with multicore biopsies targeted to SAs is a useful method to ensure high success rate for repeated biopsies in cases of suspected, organ-confined prostate cancer.

Staging and imaging technique

The pelvic CT, magnetic resonance imaging and the transrectal ultrasound examination are the most frequently used imaging methods for the staging of prostate cancer.

In our series we examined the specificity and sensitivity of pelvic CT regarding to the tumour spread to the extraprostatic area. According to our data the sensitivity of the CT was very low (less than 20%), and specificity was high (97-100%). To review of the current literature the sensitivity of CT found to be higher by other authors (30-50%). The CT examination showed understaging in many of our cases.

The endorectal magnetic resonance (EMR) examination seems to be more accurate in the staging of prostate cancer. The sensitivity of EMR regarding to the invasion of prostate capsule is between 38-88%. In the group of our patients who underwent RPP, there were 14 who had preoperatively EMR examination. In this group there were 10 of 14 where the EMR and the final pathological examination showed concordant stage of the disease. In two cases false positive and in further two cases false negative results were found. Because of the few patients in our series we can not evaluate statistically the sensitivity and specificity of EMR, but our initial results are promising concerning the most accurate preoperative staging of prostate cancer patients.

Lymphadenectomy

One of the most accurate method for evaluating the lymph nodes status is the dissection of pelvic lymph nodes in the obturator fossa.

In the majority of the cases of radical prostatectomy we used the perineal approach. Beside of numerous advantage of this method, one of the main disadvantage is that we can not evaluate the pelvic lymph nodes from this surgical approach. It could be imperative in case of PSA is >20 ng/ml.

Thanks to the technical improvement, especially the better and better manual skill we can decrease the time of both operations, which allow us to perform these two different approaches in the same time. According to our initial experiences the laparoscopic pelvic lymphadenectomy is a safe, easily tolerable intervention for the patients. After a learning curve can be easily perform even more in the same time with the RPP for the evaluation of lymph node status of prostate cancer patients.

Radical prostatectomy

The first radical prostatectomy was performed by Young in 1904. After a long brake, Mammelar and Millin reported their experiences with retropubic radical prostatectomy, in 1934.

In Hungary, Noszkay, Szüle, Wabrosch, Frang, Pajor, Romics, Hübler and Végh reported their series of radical retropubic prostatectomy. The first perineal prostatectomy was performed by Diószeghy. In our days the largest number of the perineal radical prostatectomy was performed in our department. During the period of this study, 291 perineal and 20 laparoscopic radical prostatectomies have been performed.

The efficiency of the operation is mostly depends on the appropriate selection patients. Different studies proved that the cause of majority of postoperative PSA relapse is the understaging of the disease. The appearance of PSA relapse varied between 27% and 53%.

The factor which has an important role in the postoperative progression is the preoperative PSA level. In our series there was a strong correlation between the preoperative PSA, the pathological stage and the necessity for adjuvant treatment. In the group of patients

with pT1 and pT2 disease, the average PSA was not exceed the 20 ng/ml concentration, opposite to the locally advanced cases, where the sera PSA level was 29,9 ng/ml and 42,2 ng/ml in the pT3 and pT4 group respectively.

If the preoperative PSA was less than 10 ng/ml, the necessity of adjuvant treatment was 19%. The occurrence of the adjuvant treatment was 22% and 63% when the PSA was between 10-20 ng/ml, or > 20 ng/ml respectively.

The Gleason score of the specimens has also impact on the determination of prognosis. The prognosis is much better when the Gleason score is not exceeds the 7. In our series there was a common discrepancy between the Gleason score of the biopsy and RPP specimens in the same patients. Our data support that kind of observations that the prognosis seems to be better according to the grade of the biopsy than the RPP.

Complications of radical prostatectomy

The essential objects of the radical prostatectomy are the eradication of the cancerous organ, preserving continence and potency.

In the whole group of patients with radical prostatectomy, who had postoperative complication, the histological evaluation showed locally advanced disease in 26%. This support the impact of preoperative staging and the accurate selection of patients.

Among the late complications of the operation the most frequents are incontinency, impotencies, and urinating complaints in connection with the stenosis of the anastomosis. Average appearance of incontinency is between 5 and 10%, generally. In our series there were 34 patients who had moderate or severe incontinence (11%). Typical feature is, on the base of data from the literature, continuous reduction of all complications of radical prostatectomies. Even more author publicized comparing examination of successfulness and complications of radical operations performed at the beginning then later of their experience. Identical opinion

is, that setting of operative indications, and gaining appropriate surgical experience significantly decreased the rate of occurring of complications.

Reveal and cure of prostate cancer causing paraneoplastic symptoms

Dermatomyositis belongs to systemic autoimmune diseases, typically with parallel weakness mainly of the proximal skeletal muscles and characteristic skin symptoms. In our explained patient myositis appeared as a paraneoplastic syndrome. In these cases history of the illness correlates with the malignant disease. In our patient total recovery was observed as the result of the operation. After half a year of the intervention patient does his usual previous work, on the base of the control examinations he is tumor-free, there is no sign of myositis.

CONCLUSIONS

1. On the base of my work I establish, that increasing can be observed in revealing prostate cancer and treating patients correlating with the international tendencies. Active collaboration on exploring prostate cancer between GPs and urologists is absolutely necessary both in early revealing and effective treatment of patients. Number of prostate biopsies increased five times, number of revealed diseases increased two and a half times during the examined period. Among the screening methods routine PSA examination is essential but not sufficient tool for early exploring of the disease.
2. I state, that in cases of PSA level ≤ 4 ng/ml in exploration of prostate cancer consideration of positive familiar previous history, physical examination, and factors increasing PSA sensitivity (age specific PSA, PSA velocity, F/T PSA rate) have outstanding significance. I proved, that tumours, explored by this way in several patients turn out to be significant cancer. In patients with PSA level ≤ 4

ng/ml significant tumour was founded during prostate biopsy in 47%, and in radically perineally operated patients in 59%, respectively.

3. With my work I proved the necessity the follow up of patients with negative histological bioptic result, and reason for the existence of repeated biopsies. Overall, of the 224 prostate biopsies in 53 patients was proved the malignant disease (24%), in which the previous histological examinations had been negative.
4. We examined first the role of [C^{11}]- MET-PET examination in disclosing early stage, organ confined prostate cancer. On the base of our results it can be concluded, that MET-PET examination is capable of revealing prostate cancer not larger than 0.5 cm, if the intake of the tracer is sufficient in the examined area. There was not a case with negative MET-PET and in the same time positive histological result among our patients. Appearance of MET-PET positivity attached with negative biopsy propounds the need for further investigations.
5. To decrease the number of false negative, and to increase the detection rate of prostate biopsies, we worked out and examined as a new method the role of positron emission tomography in revealing early stage, operable prostate cancer. With the help of the method during the repeated biopsies high detection rate (46%) was reached.
6. In Hungary, we introduced and applied first rectal MR examination in preoperative investigation of prostate cancer and in the establishment tumor staging. Among the sliding-imaging methods, with this examination probability of infiltration of prostate capsule, seminal vesicles or surrounding tissue can be determined with high sensitivity.
7. In Hungary I first elaborated the clinical data of largest series of patients treated with radical perineal prostatectomy. Early postoperative results of the patients are

justifying the grounds of the operation. Prognostic factors (PSA, Gleason score), the early and late postoperative results are back up the necessity of revealing the patients in early stage.

8. With demonstration of operative treatment of prostate cancer causing paraneoplastic symptoms I prove the importance of radical removal of the tumour. I call the attention for the possibility of appearance of prostate cancer in rare symptoms, and in cases of organ confined disease, need for radical removal of the tumour is proved not only by the advantage of the expecting survival, but the operation also can ensure dramatic improvement in quality of life in a short period of time for the patient.

THESIS SUPPORTING PUBLICATIONS

1. **Tóth Gy.**, Tállai B., Tóth Cs.: A prostata carcinoma korai diagnosztizálásának aktualitásáról. Endoscopy ; 1999, 2. 89-91.
2. A. Varga., Morshed S. **Gy. Tóth.**, Cs. Tóth.: Renal tumor-like pyonephrosis with foreign body. J Urol, 2001;165: 891-892. **IF.: 3,19**
3. **Tóth Gy.**, Lengyel Zs., Flaskó T., Varga A., Dezső B., Berényi E., Trón L., Tóth Cs.: Pozitronemissziós tomographia a korai prosztatarák diagnosztikájában. Magy Urol. 2002; 14. 371-379.
4. Tállai B., Flaskó T., **Tóth Gy.**, Orosz L., Tóth Cs.: Együlésben végzett laparoszkópos kismedencei lymphadenectomy és radikális perinealis prostatectomia- kezdeti tapasztalataink 4 eset kapcsán. Endoscopy 2003; 6. 27-29.
5. Berczi Cs., **Tóth Gy.**, Varga A., Flaskó T., Kollár J., Tóth Cs.: A kismedencei CT-vizsgálat jelentősége a prostatacarcinómák preoperatív stádiumának meghatározásában. Magyar Radiológia 2004;78 (5):230-235.
6. Berczi Cs., **Tóth Gy.**, Flaskó T., Muszbek L., Nemes Z., Tóth Cs.: A prostata specifikus antigén és a biopszia Gleason-értékének jelentősége a prosztatarák helyi kiterjedtségének megítélésében, saját tapasztalataink alapján. Magy Urol. 2004;16. 137-143.
7. **Tóth Gy.**, Morshed A. S., Dezső B., Flaskó T., Berczi Cs., Tóth Cs.: A 4 ng/ml alatti szérumszint prosztataspecifikus antigénszint mellett felfedezett prosztatarák jellegzetességei klinikánk betegeiben. Magy Urol, 2005; 17. 5-11.
8. **Toth G**, Lengyel Z, Balkay L, Salah MA, Tron L, Toth C.:Detection of prostate cancer with 11C-methionine positron emission tomography. J Urol. 2005 Jan;173(1):66-9; discussion 69. (**IF.: 3,713**)
9. Béla Tállai, Tibor Flaskó, **György Tóth** , Andrea Ponyi, Csilla András, Csaba Tóth and Katalin Dankó: Prostate cancer underlying acute, definitive dermatomyositis: successful treatment with radical perineal prostatectomy. Clin. Rheumatol.2005 10.1007/s10067-005-1130-9. (**IF: 1,154**)
10. Flaskó T., **Tóth Gy.**, Morshed A. Salah, Lőrincz L., Berczi Cs., Csanády G., Tóth Cs.: Laparoszkópos radikális prostatectomiával szerzett kezdeti tapasztalataink Magy Urol 2005; 2: 75-78.

11. **Tóth Gy.**, Lengyel Zs., Balkay L., Morshed A. Salah, Trón L., Tóth Cs.: A [C^{11}]-metionin pozitron emissziós tomográfia alkalmazása korai prosztaták diagnosztikájában. *Magy Urol* 2005; 2: 79-86.

Impact factor: 8,057

OTHER PUBLICATIONS

1. Böszörményi-Nagy G., Varga A., Berényi P., **Tóth Gy.**: A dupla-J katéter alkalmazásának kérdése ESWL kezelésnél. *Magy Urol*, 1994;6: 387-390
2. Szluha K., Böszörményi-Nagy G., **Tóth Gy.**, Péter M.: Urológiai elváltozások nőgyógyászati tumoros betegeknél. *Magy Urol*, 1994; 6:61-67.
3. Mikó, I., Kovács, J., Varga, A., **Tóth, Gy.**, Pető, K., Furka, I.: A veseartéria leszorítás következményei kísérletes veseműtételnél. Fény- és elektronmikroszkópos vizsgálatok. *Magy Urol* 1997;9: 127-130.
4. Mikó, I., Csabina, S., Hauck, M., Kovács, J., Schmidt, E., Pető, K., Furka, I., Varga, A., **Tóth, Gy.**, Furka, A.: Kísérletes adatok az arteria renalis leszorítását követő érkontraktilitási változásokhoz. *Magy Urol*, 1997;9: 131-135.
5. Mikó, I., Kovács, J., Schmidt, E., Pető, K., Varga, A., Furka, I., **Tóth, Gy.**: Protection of the renal artery in nephron-sparing surgery. I. Pathomorphological study. *Acta Chir Hung*, 1997;36: 233-235.
6. Mikó, I., Csabina, S., Hauck, M., Kovács, J., Schmidt, E., Pető, K., Furka, I., Varga, A., **Tóth, Gy.**: Protection of the renal artery in nephron-sparing surgery. II. Arterial contractility investigations. *Acta Chir Hung*, 1997;36: 236-239.
7. Cs. Tóth, **Gy. Tóth**, T. Flaskó, A. Nagy, E. Holman: Percutaneous Nephroscopic Ureterolithotomy *J Endourol* 1998; Suppl.12: 201.
8. Lőrincz L., **Tóth Gy.**, Flaskó T., Tóth Cs.: Konzervatív terápia szerepe a húgysavkövek kezelésében. *Endoscopy*, 1999; 2: 3-5.
9. Tóth Cs., Varga A., **Tóth Gy.**, Flaskó T., Tállai B.: A prosztatáról. *Magyar Alapellátási Archívum*, 2000;3: 107-110.
10. **Tóth Gy.**, Varga A., Tóth Cs.: Terhesség alatt előforduló urológiai szövődmények kezelési lehetőségei. *Magyar Nőorvosok Lapja*, 2001;64:471-5.
11. **Tóth Gy.**, Varga A., Flaskó T., Morshed A.S., Tóth Cs.: A vékonytübiopszia jelentősége a bizonytalan eredetű vesedaganat kórismezésében. *Endoscopy*, 2003;1: 6.

12. Cs. Tóth, **Gy. Tóth**, A. Varga, T. Flaskó, M.A. Salah: Percutaneous nephrolithotomy in early pregnancy. Int. Urol Nephrol, 2004; 00 1-3. **IF.:1,339**
13. Flaskó Tibor dr., Varga Attila dr., Tállai Béla dr., Morshed A. Salah dr., Szűcs Miklós dr., **Tóth György dr.**, Tóth Csaba dr.: Laparoszko pos műtéteinkkel szerzett kezdeti tapasztalataink. Magy Urol, 2003; 3:195-202.
14. Morshed A. Salah, Béla Tállai, Endre Holman, Munim A. Khan, **György Tóth** and Csaba Tóth.: Simultaneous bilateral percutaneous nephrolithotomy in children BJU International 2005;95: 137-139. **IF.: 2,089**
15. Varga Attila dr., Flaskó Tibor dr., Lőrincz László dr., **Tóth György dr.**, Salah Ali Morshed dr., Drabik Gyula dr., Tóth Csaba dr.: A jóindulatú vesedaganatok és kezelésük. Magy Urol, 2004;16: 212-218.
16. Tállai B., Flaskó T., Varga A., **Tóth Gy.**, Orosz L., Tóth Cs.: Kezdeti tapasztalataink gyermekekben végzett retroperitoneoszkópos nephrectomiával. Endoscopia, 2004;7: 27-31.

Impact factor: 3,428

ABSTRACTS

1. **Tóth Gy.** Lengyel Zs., Varga A., M.A. Salah, Kálvin B., Flaskó T., Berényi E., Tóth Cs., Trón L.: A PET vizsgálat szerepe a prosztaták diagnosztikájában. Magy Urol 2003. 9. 2. 153.
2. T. Flaskó, B. Tállai, **Gy. Tóth**, L. Lőrincz, Cs. Tóth: Renal cyst resection during retroperitoneoscopy. J Endourol. 2003. 17(1) S. (**IF: 1,262**)
3. Tóth Cs., **Tóth Gy.**, Flaskó T., Nagy A., Holmann E.: Percutan nephroscopic ureterolithotomy J. Endourol. 1998. 12(1)S. (**IF: 1,339**).

Impact factor: 2,601

Cummulative imcakt factor: 14,086

BOOKS AND CONTRIBUTION

1. Tóth Cs.: Az urológia színes atlasza. Medicina. 2001.
2. Tóth Csaba, Varga Attila: Sürgősségi betegellátás az urológiában. Medicina. 2003.
3. Mentőöv. Támasz a daganatellenes küzdelemben. Szerk. Szluha Kornélia. 2004.
4. Az urológia tankönyve. Szerk.: Tóth Cs. Medicina. 2005.

LECTURES AND POSTERS

1. **Tóth György**: A biopsziák jelentősége a prosztaták diagnosztikájában. 25 éves az Urológiai Klinika. 1999.09.22.
2. **Tóth Gy.**, Varga A., Tóth Cs.: The Importance of Repeted Biopsies in the Diagnosis of Prostate Cancer CEAU II. Kongresszus 2000. október 13-14., Budapest
3. Flaskó T., **Tóth Gy.**, M.A.Salah., Tóth Cs.: Preliminary experience with laser vaporosation of prostate CEAU II. Kongresszus 2000. október 13-14., Budapest
4. **Tóth Gy.**, M. A. Salah, Lőrincz L., Varga A., Tóth Cs.: Epidemiológiai szűrővizsgálat urológiai betegségek esetében. VIII. Kecskeméti Urológus Napok, 2001. május 24-26., Kecskemét.
5. **Tóth Gy.**: Prostatabiopszával szerzett tapasztalataink. Astra-Zeneca Symposium 2001. Szeptember 4
6. **Tóth Gy.**: Prosztatarák. Prosztatarák symposium.: 2002.05.10. Debrecen
7. **Tóth Gy.**: A prosztatarák epidemiológiája. Az Urológiai Klinika munkájának bemutatása. 2002. 09.30. DAB, Debrecen
8. **Tóth Gy.**: A BPH és a Prostatarák etiológiája, patogenezise és diagnosztikája. Családoctorvosi Továbbképző Program. 2002. 11.30. Debrecen
9. **Tóth Gy.**: A prostatarákos betegek gondozása. Családoctorvosi Továbbképző Program. 2002. 11.30. Debrecen
10. **Gy. Tóth**, Zs. Lengyel, A. Varga, M.A. Salah, T. Flaskó, Cs. Tóth: Can PET examination improves positive biopsy rate in patients with suspected prostate cancer? 2003. Szept. 4-7. Novi Sad. CEAU Congress V.
11. **Tóth Gy.** Lengyel Zs., Varga A., M.A. Salah, Kálvin B., Flaskó T., Berényi E., Tóth Cs., Trón L.: A PET az urológiában. Roche Uro-Oncológiai Symposium. Tihany, 2004. Junius.

12. **Tóth Gy.** Lengyel Zs., Varga A., M.A. Salah, Kálvin B., Flaskó T., Berényi E., Tóth Cs., Trón L.: A PET vizsgálat szerepe a prosztaták diagnosztikájában. 2003. Szept. 7-11. MUT kongresszus.
13. T. Flaskó, **Gy. Tóth**, L. Lőrincz, M.A. Salah, and Cs. Tóth: Extraperitoneal laparoscopic radical prostatectomy. 6th Congress of the Central European Association of Urology 2004. Sept. 9-11. Debrecen
14. **Gy. Tóth**, A.S. Morshed, Cs. Berczi, A. Varga, Cs. Tóth: Follow-up of our patients after radical perineal prostatectomy. 6th Congress of the Central European Association of Urology 2004. Sept. 9-11. Debrecen
15. B. Tállai, A.S.Morshed, T. Flaskó, **Gy. Tóth**, K.Dankó, and Cs. Tóth: Treatment of acute dermatomyositis attached to prostate cancer with radical prostatectomy. 6th Congress of the Central European Association of Urology 2004. Sept. 9-11. Debrecen
16. Cs. Berczi, **Gy. Tóth**, A.Varga, T. Flaskó, J. Kollár, Cs. Tóth: Role of preoperative CT in the local staging of prostate carcinoma 6th Congress of the Central European Association of Urology 2004. Sept. 9-11. Debrecen
17. **Tóth Gy.** Lengyel Zs., Varga A., M.A. Salah, Kálvin B., Flaskó T., Berényi E., Tóth Cs., Trón L. A PET vizsgálat jelentősége a prosztatabiopsziák találtai arányának növelésében. 30 éves az Urológiai Klinika. Jubileumi Előadások. 2004. Október.
18. **Tóth Gy.** Lengyel Zs., Varga A., M.A. Salah, Kálvin B., Flaskó T., Berényi E., Tóth Cs., Trón L. PET vizsgálatokkal szerzett tapasztalataink prosztata daganatos betegeinken. Fűvészkerti Urológus Napok. 2004. Nov. 13.