PCN in Malignancy-Associated Ureteric Obstruction

Subjects: Health Care Sciences & Services
Contributor: Bhaskar K Somani

Malignant ureteric obstruction occurs in a variety of cancers and has been typically associated with a poor prognosis. Percutaneous nephrostomy (PCN) can potentially help increase patient longevity by establishing urinary drainage and treating renal failure. PCN is to put a small tube through a kidney to drain urine.

Keywords: prostate cancer ; nephrostomy ; quality of life ; survival ; decision making

1. Overview

Malignant ureteric obstruction occurs in a variety of cancers and has been typically associated with a poor prognosis. Percutaneous nephrostomy (PCN) can potentially help increase patient longevity by establishing urinary drainage and treating renal failure. Our aim was to look at the outcomes of PCN in patients with advanced cancer and the impact on the patients' lifespan and quality of life. Materials and Methods: A literature review was carried out for articles from 2000 to 2020 on PCN in patients with advanced malignancies, using MEDLINE, EMBASE, Scopus, CINAHL, Cochrane Library, clinicaltrials.gov, and Google Scholar. All English-language articles reporting on a minimum of 20 patients who underwent PCN for malignancy-associated ureteric obstruction were included. Results: A total of 21 articles (1674 patients) met the inclusion criteria with a mean of 60.2 years (range: 21–102 years). PCN was performed for ureteric obstruction secondary to urological malignancies (*n* = −633, 37.8%), gynaecological malignancies (*n* = 437, 26.1%), colorectal and GI malignancies (*n* = 216, 12.9%), and other specified malignancies (*n* = 205, 12.2%). The reported mean survival times varied from 2 to 8.5 months post PCN insertion, with an average survival time of 5.6 months, which depended on the cancer type, stage, and previous treatment. Conclusions: Patients with advanced malignancies who need PCN tend to have a survival rate under 12 months and spend a large proportion of this time in the hospital. Although the advent of newer chemotherapy and immunotherapy options has changed the landscape of managing advanced cancer, decisions on nephrostomy must be balanced with their survival and quality of life, which must be discussed with the patient.

2. Malignancy-Associated Areteric Obstruction

Malignancy-associated ureteric obstruction occurs in a variety of pelvic cancers, often as a late manifestation, which can be secondary to locally advanced disease or nodal metastases. Treatment consists of various options ranging from ureteric stent insertion (retrograde or antegrade), to percutaneous nephrostomy (PCN), to other forms of urinary diversion. While these procedures can help to improve renal function, they also risk complications and can have a profound effect on the quality of life (QoL). Stenting can consign the patient to stent symptoms (which may include frequency, urgency, pain, haematuria, and dysuria), and regular stent changes (typically every 6–12 months) under a general anaesthetic but is generally believed to be better for QoL than long-term PCN, although give the underlying disease this might be challenging [1].

Unfortunately, in the context of locally advanced pelvic cancers, there are often scenarios whereby a patient will start with a retrograde ureteric stent (RUS), but subsequently, as this fails, it necessitates PCN insertion. In the event that a RUS change or drainage fails, the decision to proceed with PCN often marks disease progression. Without treatment of malignant ureteric obstruction, the patient will deteriorate over time with symptoms of uraemia, fluid overload, electrolyte disturbances, flank pain, urinary infections, reduction in alertness, renal failure, and subsequent death [2]. Patients with advanced malignancies, who present with acute renal failure (ARF) due to malignant ureteric obstruction, are often poor surgical and/or anaesthetic candidates, and therefore PCN, which can be done under local anaesthesia (LA), is often preferred. Similarly, it is not always possible to insert primary retrograde stents in the context of locally advanced pelvic malignancies [3][4][5].

Percutaneous nephrostomy has a high rate of technical success; however, periprocedural complications can occur. These may include sepsis, bleeding or vascular injury, perirenal haematoma, and injury to surrounding structures such as colon, liver, and lung [3]. Furthermore, PCN can block, dislodge, develop line or component fracture, become infected, or

colonised with bacteria, and patients can develop skin reactions, cellulitis, or abscesses [3]. Such complications can result in multiple readmissions to hospital, often needing a change in PCN, which can also significantly impact their QoL [1]. Emergency readmissions also happen if the PCN falls out completely, needing a new nephrostomy placement as a matter of urgency [6]. Patients with advanced cancers who develop infections secondary to nephrostomy are at a high risk of deterioration, especially if they are receiving immunosuppression such as chemotherapy or immunotherapy.

Most studies looking at malignancy-associated ureteric obstruction cover an extremely heterogenous population, with multiple different aetiologies and presentations. Treating malignant ureteric obstruction is an ever-changing landscape, and as newer cancer treatments become available, this continues to evolve. We aimed to review the quality of evidence available to date in this group of patients, establishing outcomes of PCN in malignancy-associated ureteric obstruction, assessing the risk of complications, life expectancy, QoL and potential indicators of favourable versus poorer outcomes.

3. Discussion

3.1. Findings of Our Study

The mean survival time varied from 2.6 to 8.5 months post initial PCN insertion across the studies, with an average survival time of 5.9 months (Figure 2, Table 1). The majority of studies agreed that hormone-naïve prostate cancer had a longer survival time post PCN insertion, whereas bladder cancer, cervical cancer, and hormone refractory prostate cancer all had shortened life expectancies. Poor prognostic indicators throughout the studies were patients who had already undergone cancer treatment, presence of multiple metastasis, type of cancer, degree of hydronephrosis, and a low serum albumin concentration. The number of days spent in hospital post PCN insertion were high (Table 1) and a third of the patients (range: 12.5–70%) died on the same admission while they were admitted to hospital (Figure 2).

3.2. Patient Counselling

The ethics of palliative urinary decompression have been debated, and many factors must be taken into account, such as the type and stage of malignancy, the ability for further palliative treatment, patient's quality and quantity of life along with their preference. Malignant ureteric obstruction from pelvic malignancies often presents a significant treatment dilemma for urologists. While PCN insertion is relatively safe, patients with advanced malignancies tend to have a higher risk of PCN-related complications (Table 2) and spend a large proportion of their time in hospitals. PCNs should only be pursued after thoughtful counselling regarding further treatment options and likely disease prognosis.

3.3. Quality of Life

There are no validated questionnaires specifically looking at QoL with nephrostomies in cancer patients [7]. A wide range of methods for determining QoL with a nephrostomy were used throughout the studies, ranging from whether the patient ever left hospital at all, to whether they left hospital for 6 weeks or more (Watkinson criteria [8]), to scoring them on four criteria; of little or no pain, full mental capacity, few complications related to PCN insertion, and the ability to return home (Grabstald and McPhee criteria [9]), to using EORTC-QLC-C30 questionnaires [10]. It is difficult to ascertain whether QoL is worse after PCN insertion due to the procedure, or the progression of the cancer; hence a standardised questionnaire would be useful in ascertaining this and could aid patients in making the decision on whether or not to proceed with a nephrostomy [7].

3.4. Costs of Replacement of PCN

McDevitt et al. looked at patients who had nephrostomies placed for malignant ureteric obstruction, and the causes of PCN exchanges during the follow-up period. There were 87 exchanges performed, and of those, 29/87 (33.3%) were routine elective changes, but 58/87 (66.7%) were unplanned and due to complications, such as infection (21/87, 33%), obstruction (23/87, 26%) or mechanical complications (14/87, 16%). The cost of emergency exchange vs. routine exchange was modelled to be higher, and they therefore hypothesised that decreasing the length of time to routine exchange from 90 days to 60 days would decrease the amount of readmissions for emergency exchange or replacement, which would decrease the overall cost [6].

3.5. Conversion of PCN to Ureteric Stents

In some cases, where PCN has been inserted primarily, it may be possible to convert it to an indwelling ureteric stent, usually via antegrade stenting. Wilson and colleagues reported that in 34.4% of cases, they were able to have PCN converted to an indwelling stent [9], and Misra et al. reported that 56% of all PCNs were subsequently antegradely stented and rendered nephrostomy free [11]. Folkard reported that 65% of PCNs were converted to stents.

3.6. Limitations

Almost all of the studies were retrospective, and with historic data, which made it difficult to apply them to today's cancer patients with recent advances in cancer treatment. These studies cover a heterogeneous population with some having a variety of different primary cancers, while others focus on a single cancer type, which makes interpretation difficult. As novel immunotherapy and chemotherapy options emerge, the ability to predict prognosis is more guarded, and newer information is needed to aid decision making. There were no data from situations where patients presented with hydronephrosis and the decision was not to perform PCN, and how their QoL and length of life compared to those with PCN.

Since the studies reported included a wide time interval (from 2003 to 2020), it should be appropriate to take into account that some malignancies have improved treatment options with potential benefits to prognosis and quality of life. For example, in colorectal cancer, starting from 2004 several drugs have been introduced (cetuximab, bevacizumab, and panitumumab) with advantage on cancer-specific survival. Similar improvements have been reported in prostate cancer from 2011 with new hormone-based therapies (abiraterone and enzalutamide) in metastatic castration-resistant patients, and from 2015 in metastatic hormone-sensitive patients. This treatment may also affect the quality of life and the number of days spent in hospital. Moreover, in selected cases, the option of a new treatment line can justify the insertion of ureteric stent or nephrostomy.

The retrospective nature of the included papers with different inclusion criteria makes it liable to selection bias and hence difficult to draw meaningful comparisons. Given that almost a third of the patients died on the same hospital admission as their PCN insertion suggests that a high number of reported PCNs were performed for palliative reasons. The decision on nephrostomy would have to be individualised for a given patient and must take into account their medical condition and underlying disease status.

3.7. Areas of Future Research

Prognosis of patients with malignant ureteric obstruction is mostly dependent on further treatment strategies. In recent years, there has been a big leap in oncological therapies, many of which are reliant on good renal function. In many situations now, where there is malignant ureteric obstruction, a patient may still have further options for palliative chemotherapy, immunotherapy or novel hormone therapies. However, if there are no options in reserve, the prognosis is poor with or without nephrostomies, and end-of-life care should be discussed with the patient and relatives, rather than proceeding with invasive interventions that have no impact on disease progression. Complications and death due to locally invasive cancer should be weighed against complications and death due to uraemia.

4. Conclusions

There is little doubt about the benefits of percutaneous nephrostomy for patients with a new diagnosis of disease, allowing improvement of renal function to allow staging investigations. However, in patients in the end stages of their cancer, PCN insertion should only be placed after thoughtful counselling regarding further treatment options available and disease prognosis, given that with advanced malignancies, many patients have a short life expectancy, spending most of their time in the hospital with a poor quality of life.

References

1. Bigum, L.H.; Spielmann, M.E.; Juhl, G.; Rasmussen, A. A qualitative study exploring male cancer patients' experiences with percutaneous nephrostomy. Scand. J. Urol. 2014, 49, 162–168.
2. Kouba, E.; Wallen, E.M.; Pruthi, R.J. Management of ureteral obstruction due to advanced malignancy: Optimising ther apeutic and palliative outcomes. J. Urol. 2008, 180, 444–450.
3. Radecka, E.; Magnusson, A. Complications associated with percutaneous nephrostomies. A retrospective study. Acta R adiol. 2004, 45, 184–188.
4. Wah, T.M.; Weston, M.J.; Irving, H.C. Percutaneous nephrostomy insertion: Outcome data from a prospective multi-ope rator sudy at a UK training centre. Clin. Radiol. 2004, 59, 255–261.
5. Patel, U.; Hussain, F.F. Percutaneous Nephrostomy of Nondilated Renal Collecting Systems with Fluoroscopic Guidanc e: Technique and Results. Radiology 2004, 233, 226–233.

6. McDevitt, J.L.; Acosta-Torres, S.; Zhang, N.; Hu, T.; Odu, A.; Wang, J.; Xi, Y.; Lamus, D.; Miller, D.S.; Pillai, A.K. Long-Term Percutaneous Nephrostomy Management of Malignant Urinary Obstruction: Estimation of Optimal Exchange Frequency and Estimation of the Financial Impact of Patient Compliance. J. Vasc. Interv. Radiol. 2017, 28, 1036–1042.e8.
7. New, F.; Deverill, S.; Somani, B.K. Role of percutaneous nephrostomy in end of life prostate cancer patients: A systematic review of the literature. Cent. Eur. J. Urol. 2018, 71, 404–409.
8. Watkinson, A.; A'Hern, R.; Jones, A.; King, D.; Moskovic, E. The role of percutaneous nephrostomy in malignant urinary tract obstruction. Clin. Radiol. 1993, 47, 32–35.
9. Wilson, J.R.; Urwin, G.H.; Stower, M.J. The role of percutaneous nephrostomy in malignant ureteric obstruction. Ann. R. Coll. Surg. Engl. 2005, 87, 21–24.
10. Aaronson, N.K.; Ahmedzai, S.; Bergman, B.; Bullinger, M.; Cull, A.; Duez, N.J.; Filiberti, A.; Flechtner, H.; Fleishman, S.B.; De Haes, J.C.; et al. The European Organization for Research and Treatment of Cancer QLQ-C30: A Quality-of-Life Instrument for Use in International Clinical Trials in Oncology. J. Natl. Cancer Inst. 1993, 85, 365–376.
11. Misra, S.; Coker, C.; Richenberg, J. Percutaneous nephrostomy for ureteric obstruction due to advanced pelvic malignancy: Have we got the balance right yet? Int. Urol. Nephrol. 2013, 45, 627–632.
