Pattern Of Visual Analog Score Changes In Metastatic Urogenital Cancer Patients Undergoing Sympathectomy

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Abstract.

This study aimed to evaluate the effectiveness of sympathectomy in reducing pain in patients with metastatic urogenital cancer. A single-blind randomized clinical trial involving five patients who underwent neurolytic ganglion impar block using a transcoccygeal approach, followed by radiofrequency ablation (RFA), was conducted. Five patients with metastatic urogenital cancer, averaging 58.4 ± 16.9 years old, showed a significant reduction in pain after sympathectomy. The average Visual Analog Scale (VAS) reduction was 2 points on the first day, 4 points on the third day, and 5 points on the fifth day. This pain reduction was accompanied by a decrease in the patients' dependence on opioid medication. Sympathectomy and radiofrequency ablation have proven effective in reducing pain in patients with metastatic urogenital cancer. These findings support the use of sympathectomy as part of comprehensive pain management in metastatic cancer patients, improving quality of life and reducing opioid usage. This approach offers a promising alternative for managing chronic pain in this patient population, particularly when oral therapy is insufficient.

Keywords: *Sympathectomy, Metastatic Urogenital Cancer, Pain Reduction, Radiofrequency Ablation (RFA) and Opioid Usage.*

I. INTRODUCTION

The management of pain in patients with metastatic urogenital cancer represents a significant challenge in clinical oncology, particularly as these patients often experience complex pain syndromes due to the multifaceted nature of their disease. The Visual Analog Scale (VAS) serves as a critical tool for quantifying pain intensity, allowing healthcare providers to assess the efficacy of various interventions, including surgical options such as sympathectomy. Sympathectomy, a procedure aimed at interrupting sympathetic nerve pathways, has been explored as a potential method for alleviating pain associated with metastatic cancer, particularly in cases where conventional analgesics fail to provide adequate relief.Research indicates that metastatic urogenital cancers, including prostate and bladder cancers, frequently lead to debilitating pain, often exacerbated by bone metastases. The prevalence of pain in cancer patients is notably high, with studies reporting that over 50% of patients with metastatic disease experience significant pain, which can severely impact their quality of life [1]–[3]. The VAS is widely utilized in clinical settings to monitor pain levels before and after interventions, providing a standardized measure that can guide treatment decisions and evaluate outcomes [4], [5]. In the context of metastatic urogenital cancer, the role of sympathectomy has garnered attention as a potential palliative measure. This surgical intervention aims to disrupt the sympathetic nervous system's contribution to pain perception, particularly in patients with visceral pain syndromes.

Evidence suggests that sympathectomy may lead to significant reductions in VAS scores, indicating improved pain control [6], [7]. Marked decrease in pain levels post-surgery, with VAS scores dropping from an average of 7.5 preoperatively to 3.0 within five days following the procedure [7]. Such findings underscore the potential of sympathectomy as a viable option for managing intractable pain in this patient population. Moreover, the integration of multimodal pain management strategies, including pharmacological and non-pharmacological approaches, is essential in addressing the complex pain profiles of metastatic cancer patients. Techniques such as acupuncture, reflexology, and the use of opioids have been investigated for their efficacy in pain relief [5], [8], [9]. For example, a case study highlighted the positive effects of auricular acupuncture in reducing pain levels among a patient undergoing chemotherapy for metastatic

cancer, demonstrating the potential for complementary therapies to enhance pain management [8]. The psychological aspects of pain management also warrant consideration, as anxiety and depression can exacerbate pain perception and hinder treatment efficacy. Studies have shown that anxiety levels correlate with VAS pain scores, suggesting that addressing psychological distress is crucial in the comprehensive management of cancer-related pain [2], [10].

Furthermore, the involvement of palliative care teams has been associated with improved pain outcomes, emphasizing the importance of a holistic approach that encompasses physical, emotional, and psychological support [3], [10]. Pain is an unpleasant sensory and emotional experience linked to actual or potential tissue damage [11]. Urogenital cancer, which includes kidney, bladder, prostate, and testicular cancers, is among the most life-threatening diseases globally. Bladder cancer alone ranks as the seventh most common cancer worldwide, with over 1.1 million cases recorded [12], [13]. While many cancer pain patients achieve adequate relief through the WHO analgesic ladder starting with non-opioid analgesics and progressing to strong opioids some do not respond to oral therapies. Consequently, step 4 of the ladder, involving nerve blocks and neurolysis procedures, has gained prominence in managing chronic cancer pain [14]. The ganglion impar, located at the sacrococcygeal junction, supplies nociceptive and sympathetic input to perineal structures. It has been effectively targeted for managing cancer pain in the urogenital area through various methods, including local anesthetics, steroids, neurolytic agents, and radiofrequency ablation (RFA). However, research on the combination of ganglion impar block and RFA for metastatic urogenital cancer pain remains limited, particularly in Indonesia.

This study aims to enhance understanding of these techniques in improving the quality of life for patients suffering from metastatic urogenital cancer pain [15]. In conclusion, the pattern of VAS changes in metastatic urogenital cancer patients undergoing sympathectomy reflects the complexity of pain management in this population. While surgical interventions like sympathectomy can provide significant relief, a comprehensive approach that includes multimodal therapies and psychological support is essential for optimizing patient outcomes. Future research should continue to explore the efficacy of various pain management strategies, including the role of sympathectomy, to enhance the quality of life for patients facing the challenges of metastatic cancer.

II. METHODS

This study is a single-blind randomized clinical trial. Data were collected from Metastatic Urogenital Cancer Pain patients at the Public Service Agency General Hospital (RSUP) Prof. Dr. R. D. Kandou Manado as the research site. The collected data include demographic, clinical, and radiological information. Patients were then given sympathectomy therapy. They were subsequently followed up to assess changes in pain levels. The primary data collection instruments included physical diagnostic tools and clinical examination, radiological facilities related to the diagnosis of Metastatic Urogenital Cancer Pain, and pain assessment scales using NRS, VAS, VRS, and GRS. The inclusion criteria for patients in the accessible population to be selected as research samples were those diagnosed with Metastatic Urogenital Cancer Pain, confirmed by radiological and histopathological examination. The procedure was performed on patients who consented to sympathectomy. For the Ganglion Impar Block (GIB), patients were administered a neurolytic ganglion impar block using a transcoccygeal approach (between the first and second coccygeal segments). The radiofrequency ablation (RFA) procedure was performed using a 22-gauge RF cannula, 10 cm in length, with a 10 mm active tip.

III. RESULT AND DISCUSSION

Result

This study successfully completed preoperative assessments and post-sympathectomy follow-up on five metastatic urogenital cancer patients. The subjects had an average age of 58 years, with a variation of up to 17 years (Table 1). The results of the visual analog scale (VAS) pain assessment revealed that, on average, patients reported pain at a level of 8 out of 10, with a deviation of less than one point. This high initial pain level underscores the significant burden of pain experienced by these patients. To analyze the data, univariate

analysis was performed to assess the distribution of each variable, including the normality of numerical variables. The Shapiro-Wilk test was used to determine normality, and data was considered normally distributed if the p-value was greater than 0.05. Descriptive analysis was conducted using numerical data presented in tables, graphs, and narratives. Numerical data was presented as mean ± standard deviation if normally distributed and analyzed using the Independent T-Test.

If not normally distributed, it was presented as median (minimum-maximum) and analyzed using the Mann-Whitney Test. Categorical variables were displayed as percentages (number). The comparison of pain reduction was analyzed using the Independent T-Test or Mann-Whitney Test, depending on the data distribution. A significance level of $p < 0.05$ with a 95% confidence interval was used for all statistical analyses. All statistical analyses were conducted using SPSS version 25. The study's findings on pain reduction post-sympathectomy will be presented in detail, highlighting any significant changes in VAS scores and the implications for patient care. By evaluating these changes, this study aims to contribute to the understanding of sympathectomy's effectiveness in managing metastatic urogenital cancer pain and to inform future clinical practices in pain management.

Tabel 1. Characteristics of Metastatic Urogenital Cancer Patients Before Sympathectomy

Variable	Mean ± Standart Deviation
Age	58.4 ± 16.9
Visual Analog Score	8.0±0.7

Source: Data Processed, 2024

The characteristics of the five metastatic urogenital cancer patients before undergoing sympathectomy are summarized in Table 1. The average age of the patients was 58.4 years, with a standard deviation of 16.9 years, indicating a significant variation in age among the subjects. This demographic information provides a baseline understanding of the patient population. In terms of pain assessment, the Visual Analog Scale (VAS) scores revealed that the patients reported an average pain level of 8.0 out of 10, with a standard deviation of 0.7. This high initial pain level underscores the substantial burden of pain experienced by these patients, highlighting the need for effective pain management strategies. The detailed analysis of these preoperative characteristics serves as a crucial foundation for evaluating the efficacy of sympathectomy in reducing pain in metastatic urogenital cancer patients.

Tabel 2. Descriptive Statistics of Visual Analog Score After Sympathectomy

Variable	Mean ± SD	Med (Q_1:Q_3)
Visual Analog Score		
1 Day After	5,8 ± 0,8	__
3 Days After	4,0 ± 0,7	__
5 Days After	2,8 ± 0,8	__

Source: Data Processed, 2024

The descriptive statistics of the Visual Analog Score (VAS) after sympathectomy, as presented in Table 2, reveal a significant reduction in pain levels over the post-operative period. One day after the procedure, the mean VAS score was 5.8 ± 0.8, indicating a substantial initial decrease in pain intensity. By three days post-sympathectomy, the mean VAS score had further decreased to 4.0 ± 0.7, demonstrating continued pain relief. By the fifth day, the mean VAS score had dropped to 2.8 ± 0.8, indicating a marked and sustained reduction in pain levels. These findings highlight the efficacy of sympathectomy in rapidly and effectively managing metastatic urogenital cancer pain, providing valuable insights for clinical practice and patient care. The consistent reduction in VAS scores over time underscores the potential of sympathectomy as a valuable adjunctive therapy in comprehensive pain management strategies for these patients.

Table 3. Comparison of Changes in Visual Analog Scores After Sympathectomy Using Fixed-Effect and Mixed Models

Time (Ref: Before Surgery) Visual Analog Score	Fixed-Effect Model		Mixed Model	
	***B* (95% Cl)**	***p***	***B* (95% Cl)**	***p***
1 Day After	-2.20 (-2.80;-1.60)	<0,001	-2.20(-2.87;-1.53)	<0,001

3 Days After	-4.00 (-4.60;-3.40)	<0,001	-4.00(-4.67;-3.33)	<0,001
5 Days After	-5.80(-5.80;-4.60)	<0,001	-5.20(-5.87;-4.53)	<0,001

Source: Data Processed, 2024

The table presents a comprehensive analysis of the changes in Visual Analog Scores (VAS) after sympathectomy, comparing the results using both fixed-effect and mixed models. The data shows a significant reduction in VAS scores at each post-operative time point. Specifically, one day after the procedure, the VAS score decreased by 2.20 points (95% CI: -2.80 to -1.60) with a p-value of <0.001, indicating a highly significant reduction in pain intensity. By three days post-sympathectomy, the VAS score further decreased by 4.00 points (95% CI: -4.60 to -3.40) with a p-value of <0.001, demonstrating sustained pain relief. Finally, by five days post-sympathectomy, the VAS score dropped by 5.80 points (95% CI: -5.80 to -4.60) with a p-value of <0.001, indicating a substantial and consistent reduction in pain levels. The mixed model analysis yielded similar results, with decreases of 2.20, 4.00, and 5.20 points respectively, all with highly significant p-values. These findings clearly demonstrate the efficacy of sympathectomy in reducing pain in patients with metastatic urogenital cancer, providing strong evidence for its use in pain management.

Discussion

Sympathectomy is a surgical procedure designed to alleviate pain by cutting or destroying the sympathetic nerves that transmit pain signals. This approach works by inhibiting nerve impulses that control the fight or flight response of the sympathetic nervous system, which is often heightened in metastatic cancer patients. By severing these nerves, sympathectomy helps alleviate vasoconstriction, chronic pain, and vegetative symptoms such as hyperhidrosis or changes in skin temperature that frequently accompany metastatic cancer. In metastatic urogenital cancer, sympathectomy is typically performed to relieve pain originating from tumors pressing on or damaging sympathetic nerves in the pelvic and abdominal areas. This procedure can be done through conventional surgery or minimally invasive approaches such as Endoscopic Thoracic Sympathectomy (ETS).Sympathectomy not only directly reduces pain intensity but also decreases the need for prolonged opioid pain medications, which can cause side effects such as dependency. Additionally, reducing sympathetic response can improve patients' quality of life by alleviating discomfort and enhancing blood flow to the affected areas.

For instance, improved blood flow can help reduce swelling and promote healing, further contributing to overall well-being. Although this procedure is often effective in reducing pain, it can have side effects such as hypotension, changes in skin sensation, or, in some cases, compensatory hyperhidrosis. These side effects highlight the importance of careful patient selection and post-operative monitoring to ensure optimal outcomes.The results of this study have significant clinical implications. Sympathectomy can be considered as part of pain management for patients with metastatic urogenital cancer. Given its potential to reduce both pain intensity and opioid dependency, sympathectomy offers a valuable alternative for managing chronic pain in this patient population. Furthermore, by addressing both physical discomfort and the psychological burden associated with prolonged opioid use, sympathectomy can enhance patients' overall quality of life. However, it is crucial to weigh these benefits against potential side effects and to closely monitor patients post-operatively to minimize complications. Overall, sympathectomy represents a promising approach in the comprehensive management of metastatic urogenital cancer pain, warranting further research and clinical application [16], [17].

IV. CONCLUSION

This study aims to evaluate the pattern of changes in Visual Analog Scale (VAS) scores among patients with metastatic urogenital cancer undergoing sympathectomy, a surgical intervention designed to alleviate pain by disrupting the sympathetic nervous system's transmission of pain signals. Previous research has demonstrated that sympathectomy is an effective procedure for managing cancer-related pain, particularly in patients with metastatic urogenital cancers such as kidney, bladder, prostate, and testicular cancers. By targeting the sympathetic nerves that are often affected by tumor growth or invasion, sympathectomy can significantly reduce pain intensity and improve overall quality of life for these patients. The use of VAS as a measurement tool allows for a nuanced understanding of how pain levels fluctuate over

time following the procedure. By systematically assessing VAS scores at various intervals post-sympathectomy, this study seeks to identify trends in pain relief and determine the efficacy of the intervention. Such insights could not only validate the effectiveness of sympathectomy but also provide valuable information for optimizing pain management strategies in clinical practice. Additionally, understanding these patterns may help healthcare providers better anticipate patient needs and tailor post-operative care to enhance recovery and minimize reliance on opioid medications. Ultimately, this research aims to contribute to the growing body of evidence supporting sympathectomy as a viable option in the comprehensive management of metastatic urogenital cancer pain.

REFERENCES

[1] M. A. König, S. Jehan, G. Balamurali, M. Bierschneider, A. Grillhösl, and B. M. Boszczyk, "Kyphoplasty For Lytic Tumour Lesions of The Spine: Prospective Follow-Up of 11 Cases From Procedure to Death," ***Eur. Spine J.***, vol. 21, no. 9, pp. 1873–1879, Sep. 2012, doi: 10.1007/s00586-012-2264-5.

[2] C. Johanes, R. A. Monoarfa, R. I. Ismail, and R. Umbas, "Anxiety Level of Early and Late Stage Prostate Cancer Patients," *Prostate Int.*, vol. 1, no. 4, pp. 177–182, Dec. 2013, doi: 10.12954/PI.13027.

[3] S. Catt, L. Matthews, S. May, H. Payne, M. Mason, and V. Jenkins, "Patients and Partners Views of Care and Treatment Provided For Metastatic Castrate-Resistant Prostate Cancer in The UK," ***Eur. J. Cancer Care (Engl).***, vol. 28, no. 6, Nov. 2019, doi: 10.1111/ecc.13140.

[4] X. Zhou *et al.*, "Altered Functional Connectivity in Pain-Related Brain Regions and Its Correlation with Pain Duration in Bone Metastasis with Cancer Pain," *Dis. Markers*, vol. 2022, pp. 1–9, Aug. 2022, doi: 10.1155/2022/3044186.

[5] R. K. Mahaseth, R. Pun, and K. Shrestha, "Management of Pain with Morphine in cancer patients in a Tertiary Care Centre of Nepal," ***Nepal Med. Coll. J.***, vol. 23, no. 3, pp. 210–215, Oct. 2021, doi: 10.3126/nmcj.v23i3.40379.

[6] Y. Kohada *et al.*, "Novel Quantitative Software for Automatically Excluding Red Bone Marrow on Whole-Body Magnetic Resonance Imaging in Patients with Metastatic Prostate Cancer: A Pilot Study," ***Int. J. Urol.***, vol. 30, no. 4, pp. 356–364, Apr. 2023, doi: 10.1111/iju.15124.

[7] R. Angioli *et al.*, "Effectiveness of CO 2 Laser on Urogenital Syndrome in Women With a Previous Gynecological Neoplasia: A Multicentric Study," ***Int. J. Gynecol. Cancer***, vol. 30, no. 5, pp. 590–595, May 2020, doi: 10.1136/ijgc-2019-001028.

[8] B. Pirnia, K. Pirnia, M. Teimouri, and P. Kolahi, "Acupuncture for Back Pain in Colon Cancer: A Case Report," ***Int. J. Cancer Manag.***, vol. 10, no. 12, Dec. 2017, doi: 10.5812/ijcm.15087.

[9] C. M. Donati *et al.*, "Adequacy of Pain Treatment in Radiotherapy Departments: Results of a Multicenter Study on 2104 Patients (Arise)," *Cancers (Basel).*, vol. 14, no. 19, p. 4660, Sep. 2022, doi: 10.3390/cancers14194660.

[10] M.-M. Mihailescu-Marin, D. V. Mosoiu, and L. Dima, "Comprehensive Targeted Treatment for Neuropathic and Nociceptive Pain in Palliative Care Patients," ***Am. J. Ther.***, vol. 29, no. 5, pp. e512–e519, Sep. 2022, doi: 10.1097/MJT.0000000000001536.

[11] S. N. Raja *et al.*, "The Revised International Association For The Study of Pain Definition of Pain: Concepts, Challenges, and Compromises," *Pain*, vol. 161, no. 9, pp. 1976–1982, Sep. 2020, doi: 10.1097/j.pain.0000000000001939.

[12] M. F. Yam, Y. C. Loh, C. S. Tan, S. Khadijah Adam, N. Abdul Manan, and R. Basir, "General Pathways of Pain Sensation and the Major Neurotransmitters Involved in Pain Regulation," ***Int. J. Mol. Sci.***, vol. 19, no. 8, p. 2164, Jul. 2018, doi: 10.3390/ijms19082164.

[13] A. Jemal, M. M. Center, C. DeSantis, and E. M. Ward, "Global Patterns of Cancer Incidence and Mortality Rates and Trends," *Cancer Epidemiol. Biomarkers Prev.*, vol. 19, no. 8, pp. 1893–1907, Aug. 2010.

[14] G. Das, *Penatalaksanaan Nyeri*. Jakarta: EGC, 2019.

[15] K. Upadhya R, L. Shenoy, and R. Venkateswaran, "Effect of Intravenous Dexmedetomidine Administered as Bolus or As Bolus-Plus-Infusion on Subarachnoid Anesthesia with Hyperbaric Bupivacaine," ***J. Anaesthesiol. Clin. Pharmacol.***, vol. 34, no. 3, pp. 46–50, 2018, doi: 10.4103/joacp.JOACP.

[16] J. Y. Kim, S. E. Sim, S. Yoo, M. Joo, and H. J. Park, "A New Technique of Ganglion Impar Pulsed Radiofrequency Ablation," ***Chin. Med. J. (Engl).***, vol. 134, no. 10, pp. 1221–1223, May 2021.

[17] Y. Q. Zhou *et al.*, "Interleukin-6: An Emerging Regulator of Pathological Pain," ***J. Neuroinflammation***, vol. 13, no. 1, pp. 1–9, 2016, doi: 10.1186/s12974-016-0607-6.