BMJ Open Surgical treatments of metastatic bone disease of the hip joint: a scoping review protocol

Li Mao (),^{1,2} Jiling Liu,^{1,2} Zhenxiao Yang,^{1,2} Chiheng Yan,^{1,2} Dagang Feng²

To cite: Mao L, Liu J, Yang Z, et al. Surgical treatments of metastatic bone disease of the hip joint: a scoping review protocol. *BMJ Open* 2025;**15**:e083406. doi:10.1136/ bmjopen-2023-083406

Prepublication history and additional supplemental material for this paper are available online. To view these files, please visit the journal online (https://doi.org/10.1136/ bmjopen-2023-083406).

LM and JL contributed equally.

Received 19 December 2023 Accepted 20 March 2025

Check for updates

C Author(s) (or their

BMJ Group.

Chenadu China

Chengdu, China

Correspondence to

847704614@qq.com

Dr Dagang Feng;

employer(s)) 2025, Re-use

¹Chengdu University of

permitted under CC BY-NC. No

commercial re-use. See rights

and permissions. Published by

Traditional Chinese Medicine,

²Hospital of Chengdu University of Traditional Chinese Medicine.

ABSTRACT

Introduction Metastatic disease of the hip causes severe pain and is a serious threat to the patient's motor function. Surgery is required, but the actual efficacy is unclear, and there are many concerns for both patients and doctors. The purpose of this protocol is to conduct a scoping review for helping decisions of the intended audience.

Methods and analysis This scoping review will be conducted according to the framework proposed by Arksey and O'Malley and reported in accordance with Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols Extension for Scoping Reviews criteria. To answer our research questions, we will search Chinese and English databases using appropriate search terms, comb through clinical studies on surgical procedures for metastatic bone disease of the hip and incorporate visual charts and graphs to provide a comprehensive analysis and evaluation of the literature according to the criteria for basic characteristics, interventions and outcome indicators.

Ethics and dissemination Since the data are publicly available, no ethical approval or participant consent is required. The results of the review will be published in an open-access peer-reviewed journal and presented at national and international conferences.

INTRODUCTION

The global incidence of cancer continues to rise each year. According to the Global Cancer Statistics 2022 from the International Agency for Research on Cancer, cancer led to 9.7 million deaths in 2022. The most common newly diagnosed cancers include lung cancer (2.5 million cases), breast cancer (2.3 million cases), colorectal cancer (1.93 million cases) and prostate cancer (1.47 million cases).¹ Despite the pandemic may have delayed cancer screening data, lung cancer, colorectal cancer, breast cancer and prostate cancer still top the list of cancers. Moreover, their recurrence and metastasis rates remain exceedingly high.² The skeleton is a common site for metastases. One study showed that approximately 70% of cases of metastatic bone tumours originated from breast, prostate, lung or other cancers.³ Further data revealed that some patients with breast (36%), lung

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ Our scoping review will demonstrate the importance of hip-related surgery in bone metastatic disease and provide reference evidence for patients, doctors and policymakers.
- ⇒ The following guidelines are used: Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews.
- \Rightarrow There will be no language restrictions to include as much evidence as possible.
- ⇒ Implant and supply cost will be included in the data collection form.
- \Rightarrow The risk of bias will not be assessed.

(16%) and bowel cancer (12%) were diagte nosed with bone metastases as early as their initial diagnosis and treatment.⁴ Compared with patients in the premetastatic stage, bone metastasis significantly increases the data risk of death and decreases survival rates.⁵ Most individuals with bone metastasis may **B** experience skeletal-related events (SREs), including hypercalcaemia, spinal cord injuries, pathological fractures and uncontrolled pain. ⁶Patients in the early stages of metastasis may not easily detect the condition, mistaking it for other bone or neurological diseases, delaying treatment. Lower limbs, especially the hip joint, are weight-bearing bones essential for upright activities and walking. Impaired mobility and bedridden conditions can lead to various bone complications such as muscle atrophy and lower limb thrombosis, severely impacting patients' daily lives and o quality of survival. Moreover, untreated pathological fractures and additional diseases can evolve into critical conditions, endangering patients' life safety.⁷ The treatment principles for metastatic bone disease primarily depend on the type of primary tumour and the organ involved. Local radiotherapy, systemic use of bone resorption inhibitors, synthetic metabolic agents and radioisotopes are recognised as the main modes of treatment.⁸ However, if the scope of bone metastasis is extensive,

BMJ Group

there is a risk of fractures, or if pathological fractures have occurred, immediate stabilisation or reconstruction of the joint is necessary while removing highly affected bone and surrounding tissues.⁹

Surgical treatment can effectively relieve tumour compression symptoms on surrounding nerves and blood vessels, alleviate cancer pain, and restore limb structure and musculoskeletal function.¹⁰ The core of surgical treatment lies in effectively determining the timing and method of surgery, striving to address potential pathological fractures before fractures or paralysis occur, preventing emergencies. While surgeries for metastatic bone disease are often palliative for systemic diseases, compared with non-surgical treatments such as radiotherapy, chemotherapy, anti-angiogenic therapy and bone-modifying agents, surgical interventions are insufficient to relieve pain, rebuild function, and improve survival quality.¹¹ Additionally, surgery provides histological diagnosis of bone metastatic lesions, facilitating further comprehensive treatment of the disease. Among these surgical procedures, the hip joint becomes a challenging point for treatment due to its unique anatomical position,¹² especially involving lesions in the hip socket and pelvic stress conduction area. These joints bear enormous stress when standing under load, making them the most common site for pathological fractures.¹³ Periarticular metastatic damage often causes gradual displacement of the femoral head towards the top and inner side of the acetabulum, sometimes resulting in acute acetabular fractures or collapse; despite effective radiotherapy, this site may experience local bone dissolution and necrosis, leading to pathological fractures or joint collapse.¹⁴ In these critical situations, surgical treatment is necessary, and hip joint surgery itself is complex.¹⁵ The most used classification system for periacetabular bone metastases is the Harrington classification.¹⁶ If the acetabular bone damage is small and the displacement of the femoral head is not apparent, the ordinary bone cemented total hip arthroplasty can achieve good results.¹⁷ However, if extensive acetabular bone damage occurs and the remaining part is difficult to prevent the displacement and loosening, ordinary total hip replacement is not suitable.¹⁸ As bone cement can withstand pressure but not shear stress,¹⁹ fixation methods such as liners, Steinmann pins, hollow screws and composite bone cement are used to bridge bone defects when necessary. ^{20 21}Percutaneous acetabulum three-column hollow screw fixation technology can restore acetabular strength and weightbearing function in some patients.

Meanwhile, patients, their families and doctors often face a dilemma about whether hip surgery should be performed. Apart from facing the complexity of hip joint surgical procedures, they must also consider whether the primary tumour, and the patient's physical condition may add significant risks of surgery and whether the value of procedures truly outweighs the risks.²² Therefore, researchers advocate for a multidisciplinary collaborative treatment (MDT), which involves the rational and

BMJ Open: first published as 10.1136/bmjopen-2023-083406 on 29

planned development of individualised comprehensive treatment plans for patients. They call for a clear division of labour among orthopaedic, oncology and radiotherapy physicians.²³ However, we hope to gain a comprehensive understanding of the specific outcomes and postoperative adverse reactions of these patients, determining whether the surgery truly extends their survival or improves their quality of life.

Numerous researchers have conducted clinical studies on surgical treatment for hip joint metastatic diseases.²⁴ Regarding the overall analysis of this clinical evidence, **A** reviews primarily focus on systematic reviews and meta-analyses, with limitations on study types.²⁵ A scoping review is a method for determining the literature scope or coverage of a topic, clearly indicating the available liter- 8 ature and the quantity of studies, providing an overview **Y** of their focus.²⁶ Its purpose is not to excessively assess the **g** study design, methods and reporting quality of clinical **,** research. Different from previous reviews and systematic evaluations, considering the current research goals, this review will integrate existing clinical studies. Its results review will integrate existing clinical studies. Its results in the second of the properties of clinical studies. Its results in the second of the properties of clinical studies on surgical treatments for hip joint metastases. Although clinical research evidence and reviews have been published, reports on scoping reviews are scarce. For such surgical procedures, this scoping review will consider the balance between the second reviews have been published, reports on scoping review are scarce. For such surgical procedures, this scoping review will consider the balance between the second reviews have been published, reports on scoping reviews are scarce. For such surgical procedures, this scoping review will consider the balance between patients' unmet needs, benefits and risks, providing clinical evidence support for clinicians' and patients' decision-making.
Review questions
This study aims to address the following questions: (1) what are the characteristics of existing clinical studies? For example, information about participants (P), inter-ventions (I), comparisons (C), outcomes (O) and study testing surgical treatments? (3) Should these types of surgical procedures are really be performed? Under what circumstances should they be conducted? (4) What impact does surgery have on patients' survival?
METHODS
METHODS
METHODS
Met research team consists of specialised orthopaedic surgeons, oncologists, statisticians and research assistants. Literature screening and information extraction will be author team, with any uncertainties or discrepancies resolved by senior researchers within the team and relevances resolved by senior researchers within the team and relevances resolved by senior researchers for Systematic Review and mathematical experts.
Mao L, et al. BMJ Open 2025; 15:e083406. doi:10.1136/bmjopen-2023-083406 will present the characteristics of clinical studies more

Meta-Analysis Protocols (PRISMA-P) and PRISMA Extension for Scoping Reviews (PRISMA-ScR).²⁷ The review will be conducted according to the framework proposed by Arksey and O'Malley²⁸ and the enhancements proposed by Levac et al.²⁹ This protocol was not prospectively registered in any literature review databases (eg, PROSPERO) as it is not applicable.

Inclusion and exclusion criteria

Characteristics of participants

Patients aged 18 and above undergoing hip joint-related surgery due to bone metastatic diseases.

Concept

The study will describe the status of surgical research on metastatic diseases of the hip joint, focusing on the characteristics of clinical studies, existing issues and future research directions. For such surgeries, this scoping review will also consider the balance between patients' unmet needs, benefits and risks, providing clinical evidence support for doctors and patients' decision-making.

Context

Patients may be in a poor overall condition under the burden of the malignancy; having undergone radiotherapy, chemotherapy or other relevant treatments; or may be in advanced stages of the disease, facing severe conditions. Metastases in the hip joint are common, causing severe pain and impacting the quality of life; osteoporosis in elderly individuals poses a significant risk of pathological fractures, threatening patients' life safety. Additionally, hip joint-related surgeries involve complex classifications, with more concerns in surgical interventions for pathological fractures.

Types of sources

There will be no restrictions on the methodology of the study, and the language is limited to Chinese and English. However, publications must consist of peer-reviewed papers or theses. To ensure journal publication quality, Chinese journals are limited to those indexed in the Chinese Science Citation Database, Chinese Core Journals Guide, or Chinese Science and Technology Core Journals. English journals can be indexed in the Science Citation Index (SCI) or SCI-Expanded.

Excluded literature

Brief cases, articles without full-text availability, surgeries related to primary bone tumours, basic experimental studies and evaluations that simultaneously assess other joint metastatic diseases or surgeries, among others. Exclusion criteria may be revised as the scoping review progresses. Discussions with other senior researchers in the team will be conducted when necessary to increase familiarity with the literature and record reasons for exclusion.

Search strategy

The literature search will be conducted from the following databases: English databases including Web of Science, PubMed, Cochrane Library, Embase, Medline and Scopus and Chinese databases including China National Knowledge Infrastructure (CNKI, https://www.cnki. net/), SinoMed (http://www.sinomed.ac.cn/), Chinese Science Journals Database (VIP, https://gikan.cgvip. com/) and Wanfang Database (https://www.wanfangdata.com.cn/). Besides these formal searches, relevant **D** references suitable for inclusion will also be considered. Grey literature may include guidelines, policies, protocols, reports and papers from other resources. The team will collectively devise the search strategy. English search terms will employ relevant MeSH terms from PubMed. g terms will be subdivided for MeSH terms searches.³⁰ The search timeframe will cover the period from the establishment of the database up to November 2023, and languages will be limited to Chinese or English. Refer to the online supplemental additional file 1 for specific a search strategies. for uses re

Study collection and extraction

Records from databases will be exported to reference management software (NoteExpress, V.3.5.0), where duplicate records will be removed. Subsequently, titles õ and abstracts will be screened to verify usability, and confirmation of journal type will be cross-checked against their official websites. Full-text retrieval will be conducted for those meeting the inclusion criteria, with reasons for exclusion of full-text articles duly recorded. The literature screening flowchart is depicted in figure 1.

Data will be extracted from the literature using an Excel spreadsheet (Excel 2013) to record and manage the data. \triangleright During the protocol phase, a pilot text-based table has been developed to collect basic information from the included studies, encompassing: (1) general information (title, publication year, journal name, authors, primary tumour, follow-up time); (2) study design type; (3) publication details (diagnostic criteria, inclusion criteria, exclusion criteria, sample size, participant information, demographic or descriptive data (eg, age, gender)); (4) intervention measures (types of surgeries); (5) results and adverse events (eg, surgical parameters, patient or implant survival rates, functional status, postoperative 2 revisions and complications); and (6) implant and instrument cost analysis.

A preliminary data extraction table will be piloted on the first five articles to ensure consistency in the extraction process. Any necessary modifications to the data extraction table will be made and documented accordingly. Not all items may be applicable to each study. If essential information is found to be unattainable during this process, the literature will be excluded. Table 1 shows the data extraction template.



Figure 1 Flow diagram of the literature screening process.

Results analysis and summary

The results will be presented through descriptive statistical analysis, using visual charts to analyse quantitative and qualitative data for comparison. Evidence will be presented in various formats (such as narrative, visual aids, tables) contingent on the type of data analysis performed. For instance, line or bar graphs will be generated by Origin to depict the publication years of the studies, and Python will be used to produce bubble charts related to outcome indicators. Finally, these statistical findings will be discussed and explored.

Patient and public involvement

Patients and/or the public were not involved in the design, conduct, reporting or dissemination plans of this research.

ETHICS AND DISSEMINATION

Since the data are publicly available, no ethical approval or participant consent is required. The results of the review will be published in an open-access peer-reviewed journal and presented at national and international conferences.

DISCUSSION

With cancer prevalence escalating globally, it is increasingly acknowledged as a common and chronic disease.

Concurrent advancements in treatment methods and technologies have significantly prolonged the survival of cancer patients. As cancer patient care transitions into a chronic disease management model, emphasis on improving the quality of life becomes crucial. While **G** patients benefit from increased survival, the risks of bone ⊳ metastasis and SREs also rise.

These complications change the quality of survival and may reduce overall survival (OS). Treatment of the tumour itself leads to systemic calcium and bone loss, for instance, oestrogen deprivation in women with breast cancer and men undergoing androgen deprivation therapy accelerates bone turnover, leading to a decrease in bone mineral density and an increase in fracture incidence by 40%–50%.³¹ Bone metastases are found in most elderly patients because of bone pain or pathologic fractures, which are often confused with benign pathology because of the prevalence of degenerative disease and **a** osteoporosis in these patients. Radiation therapy is the treatment of choice for localised bone pain, but in many patients, the pain is widespread and difficult to localise, while others may experience recurrence of bone pain after radiation therapy. In addition, osteolysis after radiotherapy is more likely to lead to pathologic fractures and collapse. The hip joint, as a major weight-bearing bone, is more prone to degenerative fractures than ordinary bones. Most appendicular metastases tend to occur in the

Open	aco	cess
------	-----	------

		e						
Data extraction form								
No.		1	2	3	4	5		
General information	Title							
	Journal							
	Authors							
	Publication year							
	Country							
	Registration							
Study design	Method							
	Diagnostic criteria							
	Inclusion criteria							
	Exclusion criteria							
	Sample size							
Population	Patient's age							
	Primary malignancy							
	Location of the bone lesion							
	Duration of the observation							
Intervention	Type of operation							
	Duration of the operation							
	Estimated blood loss							
Outcomes and adverse events	Functional status							
	Implant survival							
	5-year overall survival rate							
	Safety indicators							
	Adverse events							
Others	Implant and supply cost							

pelvis and femur. In all long bone metastases, more than half of the pathologic fractures occur in the proximal femur⁹ because the loads on the trochanter of the femur are greater than any other part of the long bone and can be up to six times the body weight. Retrospective studies have shown³² that the extent of bone destruction around the femoral trochanter, even if small lesions, is associated with a high risk of fracture and that lesions located in the centre of the long bone have a lesser effect on bone strength, whereas eccentrically growing foci lead to an increased risk of fracture. Pathologic fractures around the hip are influenced by several factors, and the importance of surgical treatment is obvious in this patient population. Considering the primary disease and the overall physical condition, many patients and families forgo surgical treatment when they weigh the cost and value of treating the

primary tumour and the hip-related surgery; even doctors may counsel against surgery because they are concerned about whether the unknown postoperative survival will be sufficient for patient's recovery of motor function or whether postoperative complications will shorten the patient's survival. So, should these types of surgeries be performed? How do we measure their needs and values? Perhaps this article will do something to answer these questions.

This study aims to answer these questions by conducting **•** a scoping review of the current clinical research. Despite previous consensus among experts on treating bone metastasis, it was often focused on a specific tumour's bone metastatic diseases, failing to emphasise specific surgeries related to the hip joint. Like other types of greviews, a scoping review comprehensively identifies and analyses all clinical studies without quality assessments, using strict and transparent methods. Scoping reviews are beneficial when the primary objective is to establish a comprehensive understanding of a disease and its treatment and when there's heterogeneity in the existing literature. For our research questions, compared with other literature review methods, the scoping review is more r uses suitable and has not been extensively explored within this patient population. The intended audience for the study's results includes researchers, institutional policymakers, clinicians and patients.

Contributors All authors contributed to the study's conception and design. LM and JL participated in the design of the scoping review, the development of the programme and methodology, and the drafting of the manuscript. LM is the guarantor. ZY and CY conducted the initial search and gave feedback on the design, DF supervised and approved the scoping review protocol. All authors read and approved the final manuscript.

Funding This work was supported by Sichuan Province Traditional Chinese Medicine Development Project (2023MS386) and Research Capacity Enhancement Program '100 Talents' (20-L01).

Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, conduct, reporting or dissemination plans of this research.

Patient consent for publication Not applicable.

Provenance and peer review Not commissioned; externally peer-reviewed.

Supplemental material This content has been supplied by the author(s). It has not been vetted by BMJ Publishing Group Limited (BMJ) and may not have been peer-reviewed. Any opinions or recommendations discussed are solely those of the author(s) and are not endorsed by BMJ. BMJ disclaims all liability and responsibility arising from any reliance placed on the content. Where the content includes any translated material, BMJ does not warrant the accuracy and reliability of the translations (including but not limited to local regulations, clinical guidelines, terminology, drug names and drug dosages), and is not responsible for any error and/or omissions arising from translation and adaptation or otherwise.

Open access This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: http://creativecommons.org/ licenses/by-nc/4.0/.

ORCID ID

Li Mao http://orcid.org/0009-0003-9268-8796

Open access

REFERENCES

- Bray F, Laversanne M, Sung H, *et al.* Global cancer statistics 2022: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin* 2024;74:229–63.
- 2 Siegel RL, Miller KD, Wagle NS, et al. Cancer statistics, 2023. CA A Cancer J Clinicians 2023;73:17–48.
- 3 Pagnotti GM, Trivedi T, Mohammad KS. Translational strategies to target metastatic bone disease. *Cells* 2022;11:1309.
- 4 Hernandez RK, Wade SW, Reich A, et al. Incidence of bone metastases in patients with solid tumors: analysis of oncology electronic medical records in the United States. BMC Cancer 2018;18:44.
- 5 Zhang J, Cai D, Hong S. Prevalence and prognosis of bone metastases in common solid cancers at initial diagnosis: a population-based study. *BMJ Open* 2023;13:e069908.
- 6 Kan C, Vargas G, Pape FL, *et al*. Cancer cell colonisation in the bone microenvironment. *Int J Mol Sci* 2016;17:1674.
- 7 Nazemi AK, Upfill-Brown A, Arshi A, *et al.* Analysis of perioperative outcomes in hip resection arthroplasty. *Arch Orthop Trauma Surg* 2022;142:2139–46.
- Schwartz E, Reichert Z. Pharmacologic management of metastatic bone disease. *Bone* 2022;158.
- 9 Auran RL, Martin JR, Duran MD, et al. Management of metastatic disease in long bones. J Orthop Trauma 2022;36:481–8.
- Omar M, Graulich T, von Falck C, et al. Treatment strategies for tumor-related pathological fractures of the extremities. Unfallchirurg 2021;124:704–19.
- 11 D'Oronzo S, Coleman R, Brown J, et al. Metastatic bone disease: Pathogenesis and therapeutic options: Up-date on bone metastasis management. J Bone Oncol 2019;15:004–4.
- 12 Klemt C, Chen W, Bounajem G, *et al.* Outcome and risk factors of failures associated with revision total hip arthroplasty for recurrent dislocation. *Arch Orthop Trauma Surg* 2022;142:1801–7.
- 13 Tsagkozis P, Ehne J, Wedin R, et al. Prosthesis or osteosynthesis for the treatment of a pathological hip fracture? A nationwide registrybased cohort study. J Bone Oncol 2021;29.
- 14 Li Y, Zhou Z, Xu S, et al. Review of the pathogenesis, diagnosis, and management of osteoradionecrosis of the femoral head. Med Sci Monit 2023;29.
- 15 Plaud A, Gaillard J, Gouin F, et al. Functional and survival outcomes of patients following the harrington procedure for complex acetabular metastatic lesions. Curr Oncol 2022;29:5875–90.
- 16 Harrington KD. Orthopedic surgical management of skeletal complications of malignancy. Cancer-Am Cancer Soc 1997;80:1614–27.
- 17 Wegrzyn J, Malatray M, Al-Qahtani T, et al. Total hip arthroplasty for periacetabular metastatic disease. an original technique of reconstruction according to the harrington classification. J Arthroplasty 2018;33:2546–55.

- 18 Felden A, Anract P, Biau D. Acetabular reconstruction after advanced acetabular metastasis resection: Modified Harrington technique with a Kerboull reinforcement device. *Orthop Traumatol-Sur* 2022;108.
- 19 Formica M, Zanirato A, Bori E, et al. Biomechanical analysis of different THA cementless femoral stem designs in physiological and osteoporotic bone during static loading conditions. Arch Orthop Traum Su 2024;144:917–26.
- 20 Iljazi A, Sorensen MS, Weber KS, et al. Fully constrained acetabular liner vs. dual mobility hip joint in the surgical treatment of metastatic bone disease of the hip: study protocol for a randomized, openlabel, two-arm, non-inferiority trial evaluating the post-operative hip dislocation rate. *Trials* 2023;24.
- 21 Blankstein M, Lentine B, Nelms NJ. The use of cement in hip arthroplasty: a contemporary perspective. J Am Acad Orthop Surg 2020;28:e586–94.
- 22 Palsis JA, Brehmer TS, Pellegrini VD, *et al.* The cost of joint replacement comparing two approaches to evaluating costs of total hip and knee arthroplasty. *J Bone Joint Surg Am* 2018;100:326–33.
- 23 Soeharno H, Povegliano L, Choong PF. Multimodal treatment of bone metastasis a surgical perspective. *Front Endocrinol* 2018;9.
- 24 Christ AB, Bartelstein MK, Kenan S, *et al.* Operative management of metastatic disease of the acetabulum: review of the literature and prevailing concepts. Hip Int 2023;33:152–60.
- 25 Li B, Yu Y, Bao Y, et al. Proximal femoral tumor resection followed by joint prosthesis replacement: a systematic review and meta-analysis. BMC Musculoskelet Disord 2023;24.
- 26 Munn Z, Peters MDJ, Stern C, et al. Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach. BMC Med Res Methodol 2018;18.
- 27 Tricco AC, Lillie E, Zarin W, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): checklist and explanation. Ann Intern Med 2018;169:467.
- 28 Arksey H, O'Malley L. Scoping studies: towards a methodological framework. Int J Soc Res Methodol 2005;8:19–32.
- 29 Daudt HML, van Mossel C, Scott SJ. Enhancing the scoping study methodology: a large, inter-professional team's experience with Arksey and O'Malley's framework. *BMC Med Res Methodol* 2013;13:1–09.
- 30 Deem E, Passalacqua N, Messer D, et al. A review of anatomical terminology for the hip bone. Anat Sci Int 2023;98:463–9.
- 31 Coleman R, Body JJ, Aapro M, et al. Bone health in cancer patients: ESMO clinical practice guidelines. Ann Oncol 2014;25 Suppl 3:iii124–37.
- 32 Zhang C, Wang J, Wu H, et al. Ten-year retrospect of the investigation of proximal limbs metastasis in cancer: a multi-center study on survival outcome, limb function status and surgical procedures analysis. *BMC Cancer* 2023;23.