Palipocus: Aplicação de POCUS nos Cuidados Paliativos

Palipocus: The Use of POCUS in the Palliative Care Setting

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Resumo:

Os cuidados paliativos são cuidados holísticos prestados a indivíduos com sofrimento intenso decorrente de doença grave. A melhoria da sobrevida nas doenças malignas e não malignas levou ao envelhecimento da população, que vive com doenças crónicas avançadas e frequentemente recorre aos serviços de saúde. Os métodos imagiológicos não invasivos podem ter um papel importante nos cuidados paliativos modernos, no controlo sintomático e na abordagem de intercorrências agudas. A ecografia *point-of-care* (POCUS) trata-se da ecografia realizada à cabeceira do doente, para responder a questões clínicas dirigidas, com o objetivo de orientar a abordagem clínica. O objetivo da nossa revisão é contribuir para uma maior compreensão acerca da utilidade e adequação de POCUS em cuidados paliativos. A utilização do POCUS na prática clínica tem vindo a aumentar nos últimos anos e as suas características tornam-no uma ferramenta útil no diagnóstico e terapêutica em cuidados paliativos, nomeadamente em equipas de apoio comunitário.

Palavras-chave: Cuidados Paliativos; Ecografia; Medicina Interna; Sistemas Point of Care.

Abstract:

Palliative care is the holistic care of individuals with serious health-related suffering due to severe illness. The improving survival in malignant and non-malignant diseases results in an ageing population who live with advanced chronic diseases that commonly present to acute care settings. With our improved ability to relief symptoms and treat intercurrent complications, imaging can be an important aspect of modern palliative care. Point-of-care ultrasound (POCUS) is ultrasound used at the bedside to answer directed clinical questions and guide clinical care. The goals of our review are to provide greater understanding about utility and appropriateness of the use of POCUS in palliative care. The use of POCUS in the clinical setting has increased substantially in recent years, and its characteristics make it an attractive diagnostic and therapeutic adjunct in palliative care, namely in home-based care.

Keywords: *Internal Medicine; Palliative Care; Point-of-Care Systems; Ultrasonography.*

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Introduction

Palliative care is the active holistic care of individuals across all ages with serious health-related suffering due to severe illness and especially of those near the end of life.[1] Palliative care should be introduced early in the progression of chronic diseases, and it is not dichotomous with curative care.[2] The majority of adults in need of palliative care have chronic diseases such as cardiovascular diseases, cancer, chronic respiratory diseases, AIDS and diabetes.[3] The improving survival in malignant and non-malignant diseases results in an ageing population who live with advanced chronic diseases that commonly present to acute care settings, such as internal medicine wards or emergency departments.[4] Medical assessment may be necessary managing acute decompensation, failure of planned management strategies, or in disease progression and can take place in different settings raging from hospital services, outpatient medical clinics or home visits and decisions made in these interactions can alter the trajectory of patient care dramatically.[4,5]

Palliative care does not mean "no intervention" or "no imaging".[6] Although the treatment of patients with terminal diseases may not be curative, such patients require management of intercurrent conditions with big impact in their quality of life.[7] With improved ability to relief symptoms and treat complications, to use imaging can be an important

aspect of modern palliative care.[8] However, the decision to pursue imaging in the palliative care setting is based on careful considerations with particular emphasis on avoiding futility of care and keeping in mind balance between benefit and harm.[8]

Point-of-care ultrasound (POCUS) is ultrasound (US) used at the bedside by the provider to answer directed clinical questions and guide clinical care.[9] The use of POCUS in the clinical setting (hospitalization, outpatient visit, or home visit) has increased substantially in recent years, mainly because of the design of increasingly compact, high-quality, and more economical equipment.[10] While POCUS first gained popularity in emergency medicine, its application is rapidly expanding in the field of internal medicine.[9] POCUS is being integrated into internal medicine as an adjunct to the traditional physical examination, as it has been shown to improve overall physical examination skills when used in parallel to traditional methods, increasing diagnostic accuracy.[9] Internal medicine residency training programs recently begun to incorporate POCUS in their curricula.[11] The performance characteristics of POCUS make it an attractive diagnostic adjunct in acute palliative care.[6]

The goals of our narrative review are to provide greater understanding about utility and appropriateness of the use of POCUS in palliative care, and to encourage discussion of other potential realistic applications within this evolving field.

1. BENEFITS OF POCUS IN A PALLIATIVE CARE SETTING

The use of POCUS in palliative care patients, when appropriate, can be beneficial in many aspects:

- Non-invasive exam, with real time diagnostic efficacy and low risk of discomfort[12];
- It can be used outside of inpatient settings, making point of care imaging available for home visits, hospice or community nursing facilities[6];
- It is performed at bedside with the security of having the exam done by a practitioner known and trusted by the patient[13];
- For inpatients it can smooth the 'patient journey' by limiting the number of interdepartmental visits[13];
- It avoids transfers and repositioning required for other imaging exams, of great importance in a palliative population, avoiding precipitating symptoms such as pain, nausea, or fatigue[8];
- In the emergency setting it contributes to reducing lengths of stay, with patients discharged home sooner, particularly valuable for patients who may prefer to limit inpatient stays and maximize time at home towards the end of life[13];
- In home visits it allows the performance of diagnosis and interventional procedures more safely and effectively, avoiding unnecessary transfers to the hospital[14];
- POCUS brings the physician back to the bedside, increasing patient satisfaction and shared diagnostic understanding,[9]
- It allows expedite timely symptomatic relief[6];
- It provides useful information to assist discussions about diagnosis and prognosis.[13]

2. APPLICATIONS OF POCUS IN PALLIATIVE CARE PATIENTS:

POCUS can conceptually be used both for diagnosis and guided procedures. POCUS has been shown to improve diagnostic accuracy and decrease time to diagnosis. Procedural POCUS improves patient safety and is now standard of care for many procedures.[9]

US imaging can be useful in the palliative care setting in a wide range of specific applications including, but not limited to:

2.1. Differentiating dyspnea

Dyspnea, an ailment which is defined as a subjective inability to breathe comfortably, is one of the most common primary complaints among palliative patients.[15] It causes a heavy burden on patients and their families, and it becomes more common and severe in the final stage of progressive diseases, leading to emergency department visits and hospitalizations, restrictions in quality of life and increase in anxiety and fear.[16,17]

Dyspnea in the palliative care setting is often multifactorial and can have a large variety of possible causes, making it challenging to differentiate acute dyspnea rapidly and accurately. Many underlying disease states and acute illnesses cause shortness of breath, including pneumonia, decompensated heart failure, exacerbation of chronic obstructive pulmonary disease, pulmonary embolism, pneumothorax, atelectasis, and malignant effusions. Management tends to be symptomatic, particularly in those for whom comfort is the most important goal, however these patients often have acute needs that require medical interventions contributing for optimal symptom control.[16]

There has been growing evidence supporting the use of lung US as a diagnostic tool to help differentiate the various causes of dyspnea, leading to early identification of the presenting complaint and treatment.[18] In a focused lung examination, the pleural interface is examined in multiple locations examining specific changes to the pleura (subpleural consolidations, pleural thickening, or specific pleural artefacts), pleural space (pleural effusion) or absence of typical pleura motion (pneumothorax). Central localized malignant processes require complementary imaging strategies.[5]

Lung US can be of great worth to the physician's diagnostic armamentarium and thanks to its portability, the cause of dyspnea can be often determined during a home visit, which makes unnecessary to carry out diagnostic procedures at the hospital.[19] This rapid, repeatable, non-ionizing

and low-cost examination causes minimal discomfort to the patient, it is easy to learn, and, in most cases, it can be performed within 3 to 4 minutes. Most importantly, lung US can assist in making clinical decisions in real time at the bedside providing additional value to provide prompter relief for dyspneic patients.[20]

2.2. Differentiating low or absent urinary output

POCUS can be extremely useful in palliative care as a fast and non-invasive technique to evaluate patients with low or absent urinary output and/or acute kidney injury (AKI). A low or absent urinary output can be caused by low urinary tract obstruction (post-renal AKI) or decreased kidney function with resulting decrease in urine production (pre-renal or renal AKI). Evaluation of urinary tract obstruction and/or AKI with US encompasses the observation of both kidneys (primarily for exclusion of hydronephrosis) as well as the bladder (to evaluate urine volume, bladder distension, gross lesions or clots).

When evaluating for AKI, or when a patient complains about lumbar, flank or inguinal pain, a kidney US is essentially useful to exclude urinary tract obstruction, indirectly manifesting as hydronephrosis. Ureteric obstruction can be caused by external compression (lymph node enlargement, retroperitoneal or pelvic tumors) or internal blockage (nephrolithiasis, urothelial tumor). The use of bedside US allows the clinician to readily acknowledge hydronephrosis and prompt multidisciplinary discussion about treatment including risks and benefits of relieving the ureteric obstruction through a procedure (percutaneous nephrostomy or ureteric stenting).[6] This can result in better pain management and reduce symptoms related to kidney failure, although these benefits need to be weighed against possible complications of these procedures and the patient's expectations, as well as prognosis.[21]

A bedside bladder US can accurately estimate bladder volume, flow, and quickly diagnose urinary retention.[22] Urinary retention (organic or functional obstruction of the lower urinary tract) is relatively frequent in the palliative patient.[23] It may be caused by a blocking mass or clot in or near the bladder outlet, spinal cord injury by a compressing mass, such as a metastatic lesion, or it may be an adverse side effect from certain drugs, such as opioids, anticholinergic or antidepressant drugs.[23,24] This has important clinical implications, especially in palliative care, allowing urinary catheterization only when there is certain therapeutic impact and predictable symptomatic relief, while avoiding unnecessary catheterization in patients with non-obstructive oliguria (Box 1).

A bladder US can also be used to assess urinary catheter position and function when a decreased urine output is noted in a catheterized patient. If the catheter is in place and there is only a thin sheet of urine around the catheter's balloon, then the decreased urine output is less likely resulting from obstruction or catheter malfunction and more likely resulting from decreased urine production.

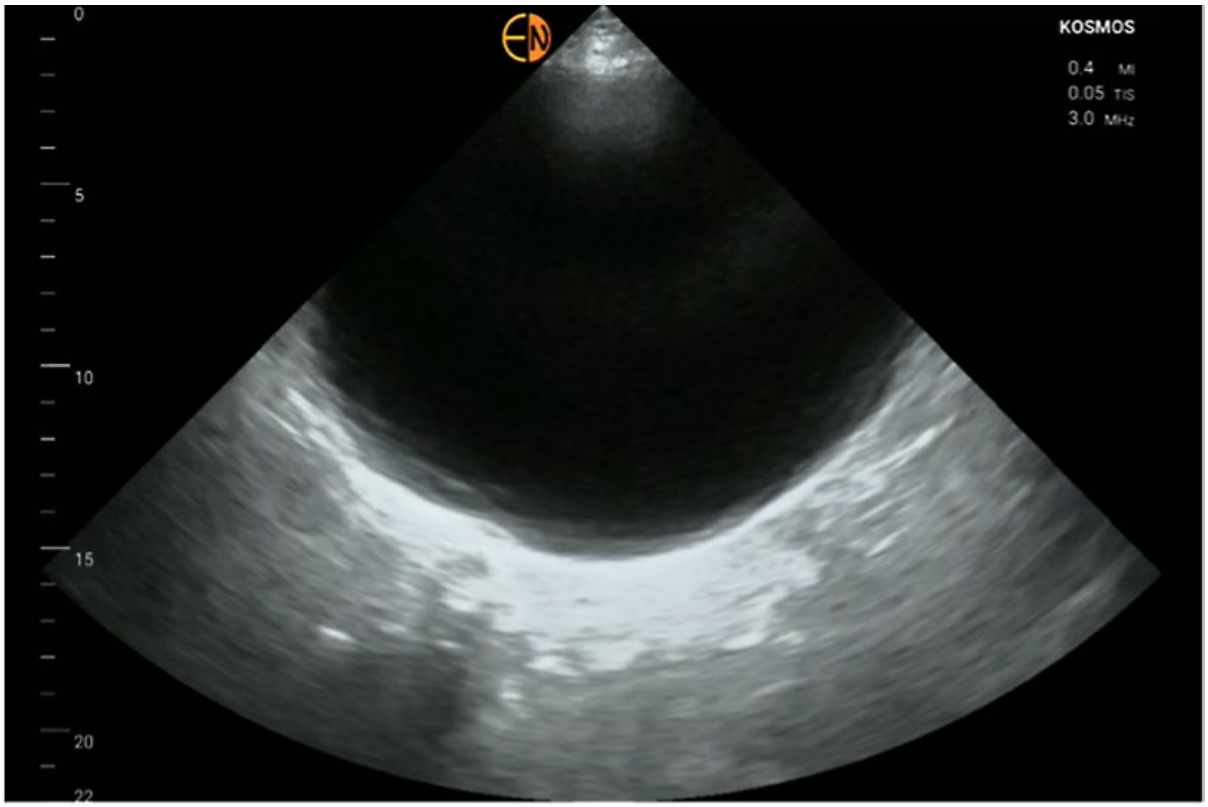

Figura 1: POCUS image showing urinary bladder distension.

Figura 2: POCUS image showing catheterized bladder.

Box 1

A 75-year-old man, with terminal lung cancer, sent from nursing home for fever, agitation, and low urinary output. A urinary tract infection was diagnosed 2 days before. At physical examination it was not clear if there was an abdominal mass on palpation. POCUS showed a big urinary bladder distension (Fig. 1). After bladder catheterization (drained 2500 of cloudy urine) the patient became progressively more comfortable (Fig. 2). POCUS as an extension of physical exam can be useful in symptom control and contribute to relief suffering.

2.3. Differentiating Gastrointestinal symptoms

Gastrointestinal symptoms, like abdominal pain, constipation, nausea and vomiting plague a large proportion of patients in the palliative phase of disease. These symptoms can arise either from the disease itself or as side effects of treatment.[25] Bedside US is a non-invasive exam, suitable for the correct diagnosis of patients presenting with abdominal pain, helping to define the underlying cause, such as ascites, intra-abdominal metastasis, urinary obstruction, biliary pathology or abscesses and bowel obstruction.[26]

Regardless of the etiology, up to 90% of patients with terminal illness report constipation. US helps to differentiate simple constipation from obstruction. Bowel obstruction may present as constipation, but these patients will normally have additional signs or symptoms such as vomiting, abdominal pain or distension, or peritoneal signs that point toward the diagnosis.[27] In a malignant population, especially in the setting of gastrointestinal tract tumors, malignant bowel obstructions are common and produce significant morbidity and mortality. Utilizing imaging to assist in ruling out this diagnosis may allow for directed therapy for better symptom control and prognostics.[8] The diagnostic performance of POCUS in mixed etiologies is favorable in comparison to conventional radiography studies when performed by the treating clinicians, making it a good option for first line exam, with no need for moving patients from their current setting or contrast administration. Typical sonographic findings include dilated small bowel loops, “to and fro” peristalsis with obstruction, the absence of peristalsis in paralytic ileus, or a collapsed colonic lumen.[5] It is recommended that patients should undergo further diagnostic imaging examinations when large gas bubbles, often arisen due to perforation and obstruction of the bowel, are observed, as they reduce the image quality and difficult its interpretation.[26]

2.4. Deep venous thrombosis

Deep vein thrombosis (DVP) is one of the most common preventable causes of in-hospital death and people with cancer are at particular risk.[28] DVP usually presents with lower limb oedema, pain and warmth and can lead to pulmonary embolism with more severe symptoms.[29]

Bedside compression ultrasonography can confirm or exclude the existence of DVP, with the advantage of being

easy to access and well tolerated by patients.[30] Although doppler US is the first choice for the diagnosis, bedside compression ultrasonography has high sensitivity and specificity in diagnosing DVT.[31] An extended compression ultrasound (ECUS) protocol can be applied to patients suspected of having DVT, starting above the inguinal ligament through to the popliteal vein and to the calf veins confluence.[31] This will allow physicians to adequately perform fast differential diagnosis and subsequently decide management in a timely manner.[10]

In the setting of palliative care the decision to start prophylactic treatment or even to treat a newly diagnosed DVP is a matter of intense debate. Life expectancy, performance status, haemorrhagic risk and patient motivation are key elements in those choices.[30] At the end of life, venous thromboembolism is considered of clinical relevance only if it confers a patient-reported symptom burden or contributes to distressing symptoms.[28]

The use of bedside compression ultrasonography for the diagnosis of DVT in palliative care has the potential to reduce lengthy in-hospital stays, mainly at the emergency department. Moreover, if performed at palliative care units or hospices, it can significantly reduce the need of hospital admission, diminishing stress imposed to the patient and caregivers (Box 2).

Box 2

A 72-year-old man with locally advanced prostate cancer, partially autonomous, calls his internal medicine doctor with complaints of swelling and pain of the right leg for one week. The doctor assists the patient at home, finds an asymmetrical swelling of the inferior limbs, and a POCUS of the right lower leg shows a clot at the popliteal vein (Fig.s 3 and 4). The patient was started on an oral anticoagulant. Two months after the episode the patient was re-evaluated with US and there was resolution of the thrombosis.

2.5. US-guided palliative interventions

Paracentesis

The symptomatic management of ascites is a challenge faced by those who provide palliative care. As the fluid accumulates the patient can develop shortness of breath, nausea, loss of appetite, swelling legs and painful abdominal distension that can be worsened by movements and transfers leading to escalation of analgesics, although sometimes only suboptimal relief of discomfort is achieved with those measures.[32] The use of paracentesis in palliation, decompressing a tense ascites-filled abdomen, can reduce distressing physical symptoms and serve as an adjunct to therapy, avoiding other measures like escalation of opioids. It should be done specifically with goal-directed intent to promote comfort and improve quality of life and not intent to cure.[33]

US can be used for diagnosis, to determine with certainty whether fluid is present, allowing safer decision-making and avoiding unnecessary procedures in situations where fluid is not significant and paracentesis would not produce

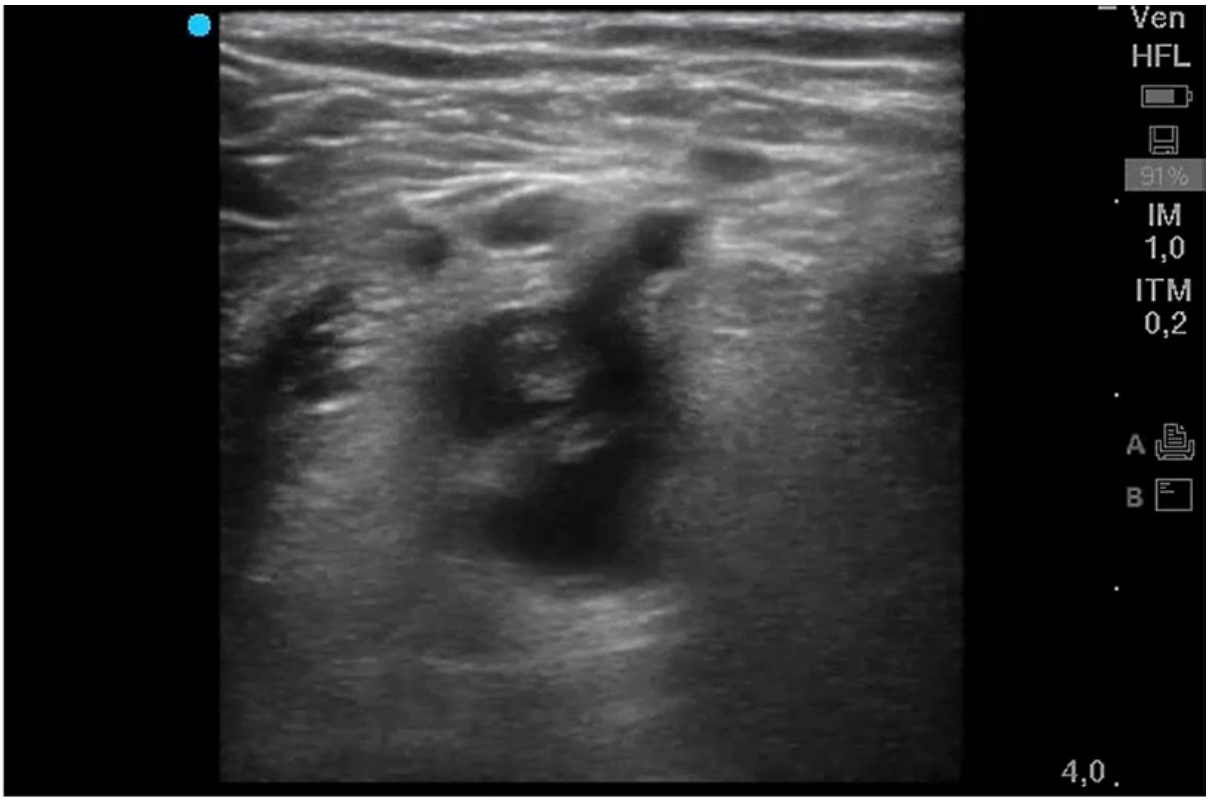

Figura 3: POCUS without compression showing popliteal thrombus.

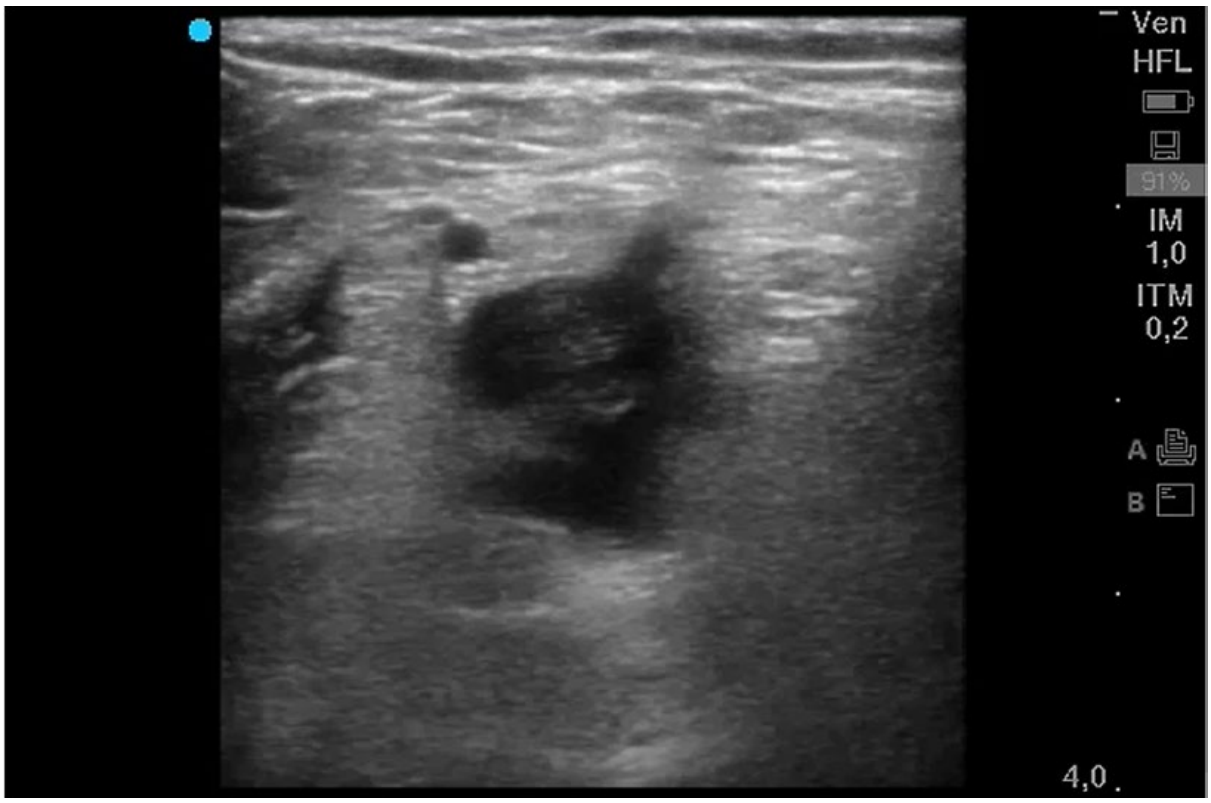

Figura 4: POCUS with compression showing popliteal thrombus.

benefit.[13,33] It is also useful to guide the technique, especially in situations of complex ascites: loculated or failure in previous drainage attempts.[11] Patients with ascites often spend unnecessary time in the hospital due to delays in investigation and procedures - bedside US can shorten in-hospital stay and can also be performed at home with a portable bedside US with satisfaction of both patients and their families, and decreases costs for the health system.[10,13,33]

Thoracocentesis

Malignant pleural effusions are a common cause of dyspnea and discomfort in patients with malignant disease under a palliative care strategy.[34] Conventionally, clinical signs and chest radiography have been used to diagnose and evaluate the need for invasive intervention to manage these pleural effusions. When thoracentesis is appropriate, US guidance has been demonstrating superiority over the conventional approach, allowing to determine the most appropriate site for catheter insertion, which becomes especially important since many malignant pleural effusions are not free. This way US contributes to the reduction in post-interventional complications like pneumothorax and a reduced rate of "dry taps" in pleural effusions that obliterate less than half of the hemidiaphragm.[6]

Also, US can be used in for treatment with percutaneous placement of small pigtail catheters that can be as effective as surgically placed chest tubes, which can be done in the community setting, and in the resolution of some catheter-associated common problems like obstruction by debris, blood clots, and tumor fragments frequently present in malignant effusions.[35]

Analgesic procedures

The use of interventional techniques to manage pain in acute care has become common and represent valuable adjuncts to the WHO Analgesic ladder and these skills are also transferable to the treatment of cancer related pain.[5] The majority of peripheral nerve blocks for pain management over single dermatomes can be performed under USG guidance - these are more accurate, generally do not need special positioning and are more comfortable to patients and safe even when performed at bedside. US guidance reduces number of unsuccessful blocks as well as complications.[34] Truncal blocks can also be performed under US guidance and are effective in treating cancer related pain. However, truncal blocks are not as simple to perform and require a long learning curve.[36] Neurolytic celiac plexus block is effective at treating intra-abdominal pain, such as in inoperable pancreatic cancer, resulting in pain relief and reduced narcotic usage. Both US-guided superior hypogastric plexus neurolysis and ganglion impar neurolysis can be used for pelvic cancer pain, such as cases of cervical cancer or rectal cancer, and can result in significant pain relief.[37]

Musculoskeletal disease is one of the most common causes of pain in older adults, being very prevalent in the palliative care population. There are several reports of patients whose

most bothersome source of pain was secondary to musculoskeletal disease and not due to their primary terminal diagnosis. Adequately treating musculoskeletal pain at the end of life, is an opportunity to improve quality of life in these patients. US is becoming an increasingly important tool in the diagnosis of a wide variety of musculoskeletal disorders and to accurately guide corticosteroid injections.[37]

Botulinum toxin injections

Sialorrhea is a common and bothersome symptom of various neurological disorders, including terminal disease such as amyotrophic lateral sclerosis and severe brain injury or stroke. Although not specifically studied in the palliative care population, SU guided botulinum toxin injections to the parotid and submandibular glands have been described as a safe and effective treatment for sialorrhea, with significantly higher rates of saliva reduction than injections performed blindly.[37]

Vascular access

Periprocedural pain during vascular access is frequent and repeated attempts can lead to hyperalgesia.[5] US guidance increases the likelihood of successful peripheral cannulation in difficult access patients.[38] In patients who need venous access, US-guided peripherally inserted Central Venous Catheters can be considered. A study investigating the impact of this technique in a palliative care population showed low levels of stress and pain at the time of placement and low incidence of complications both in the hospice and the home settings.[39]

3. LIMITATIONS

On-site US equipment within the specialist palliative care setting is still very unusual, with only a very small number of units having this facility.[13] The literature examining the use of imaging in the palliative setting is limited.[8] Specific descriptions of POCUS in palliative care are limited to case reports and case series, and there is a lack of focused prospective research in this patient population. More patient-orientated outcomes like peri-interventional pain, requirement for transfer of location, readmission, or improvement of symptoms are aspects that should also be examined prospectively.[6]

Integrating POCUS is expected to be formidable but despite these advances, internal medicine POCUS curriculum development and implementation continues to be a challenge globally for many residency training programs. Barriers include lack of access to equipment, lack of established curricula, limited availability of educational time, and lack of trained faculty. Introducing a novel technology such as POCUS into clinical practice requires resources and new infrastructure and relies nowadays on a limited supply of professionals with expertise.[11] Specific training programs for US in palliative care are not currently available, although internationally single “Palliative POCUS” courses have been run.[6] Given the ubiquity of POCUS, gaining mastery of POCUS must extend beyond image acquisition and interpretation, rather incorporating the appropriate selection of patients, consideration of pre-test probabilities, the spectrum of disease, and the expected accuracy of the exam.[40]

Conclusion

The decision to use imaging in inpatient palliative care requires a pragmatic appraisal of the benefits of potential enhanced clinical knowledge against futility and the potential for harm. We suggest that POCUS can be of substantive utility in the care for patients with acute palliative care needs, addressing common and easily recognizable complications, with no need for exam related burden such as patient transfer or contrast administration. It has the potential to optimize inpatient length of stay or even avoid unnecessary transfers to hospital, contributing for patient comfort, effective symptomatic relief, reduce complications from specific palliative interventions and reduce costs. POCUS use will likely continue to grow and ultimately become a cornerstone of bedside evaluation. The universal use of US in health care facilities contributes to the continuous lowering of equipment prices, with easier acquisition of US portable equipment by health care facilities, with major potential in the management of palliative care patients. ■

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