

Home-based paracentesis: a case series

Paracentese domiciliar: uma série de casos

Paracentesis domiciliaria: una serie de casos

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Abstract

Introduction: Paracentesis, a procedure in which free fluid is removed from the abdominal cavity through a needle puncture, is the primary treatment for large-volume and refractory ascites. Furthermore, there is a consensus in the literature that this procedure has low complication rates when correctly indicated and performed by a trained professional using the appropriate technique. However, there is few data in the literature on the performance of paracentesis at home, despite documents from the Ministry of Health indicating that it is feasible. **Objective:** To describe and analyze a case series of paracentesis procedures performed at home within a Home Care Service, as well as the profile of patients, admissions, and procedural complications. **Methods:** A cross-sectional, documentary, and retrospective study was conducted, reviewing medical records of patients admitted to a Home Care Service between 2008 and 2022. All patients who underwent paracentesis at home during this period were sequentially included. The Statistical Package for the Social Sciences software was used for descriptive and statistical analysis. **Results:** The sample consisted of 47 patients, who were admitted to the Home Care Service on 63 occasions and underwent 468 paracenteses at home. The mean age was 63.6 years, and malignant neoplasms constituted the primary cause of ascites (53.2%); 73% of patients had a Charlson Comorbidity Index indicating a high or very high risk of mortality within one year. All procedures were performed by family and community physicians. The median number of paracenteses was two procedures per Home Care Service admission (IQR: 1–6), and the median volume drained was 5 liters (IQR: 4.0–7.5). Half of the patients who required repeat paracenteses underwent a new procedure within eight days. Complications were reported in 4.7% of the procedures, and 3.4% involved major complications, such as bleeding, infections, clinical deterioration, and worsening of renal function. Three patients died due to events that, combined with the severity of their comorbidities, may be related to procedural complications. **Conclusions:** The study population consisted primarily of women over 50 years of age with liver cirrhosis or advanced-stage malignant neoplasms, who had a high burden of morbidity and mortality. The findings indicated that home paracentesis is a viable and safe practice and, according to the literature, offers benefits to the patient profile identified in the study. Based on the research findings, this study is expected to encourage and strengthen the practice of performing home paracentesis in other Home Care Service in Brazil.

Keywords: Paracentesis; Ascites; Home Care Services; House Calls; Family Practice.

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Resumo

Introdução: A paracentese, procedimento de retirada de líquido livre da cavidade abdominal por meio de uma punção com agulha, é o tratamento de escolha para ascite de grande volume e para ascite refratária. Além disso, é consenso na literatura que se trata de procedimento com baixas taxas de complicações quando indicado corretamente e realizado por profissional capacitado e com técnica adequada. Contudo, há poucos dados na literatura sobre a realização de paracentese em domicílio, apesar de documentos do Ministério da Saúde sinalizarem a viabilidade de sua realização. **Objetivo:** Descrever e analisar uma série de casos de paracenteses realizadas em domicílio de um Serviço de Atenção Domiciliar, bem como o perfil dos pacientes, das internações e das complicações dos procedimentos. **Métodos:** Foi conduzido um estudo transversal, documental e retrospectivo, com revisão de prontuários de pacientes internados em um Serviço de Atenção Domiciliar entre os anos de 2008 e 2022. Todos os pacientes submetidos à paracentese domiciliar nesse período foram sequencialmente incluídos. Para análise descritiva e estatística, utilizou-se o *software* Statistical Package for the Social Sciences. **Resultados:** A amostra foi composta de 47 pacientes, que estiveram internados no Serviço de Atenção Domiciliar em 63 ocasiões e foram submetidos a 468 paracenteses em domicílio. A média de idade foi de 63,6 anos, e as neoplasias malignas constituíram a principal causa de ascite (53,2%); 73% dos pacientes apresentou Índice de Comorbidade de Charlson indicativo de alto ou muito alto risco de mortalidade em um ano. Todos os procedimentos foram realizados por médicos de família e comunidade. A mediana de paracenteses foi de dois procedimentos por internação no Serviço de Atenção Domiciliar (IIQ: 1–6) e a mediana de volume drenado foi de 5 litros (IIQ: 4,0–7,5). Metade dos pacientes que necessitaram de paracenteses de repetição foi submetida a novo procedimento em oito dias. As complicações foram reportadas em 4,7% dos procedimentos, sendo que em 3,4% houve complicações maiores, como sangramentos, infecções, deterioração clínica e piora da função renal. Três pacientes faleceram por intercorrências que, somadas à gravidade de suas comorbidades, podem estar relacionadas a complicações do procedimento. **Conclusões:** A população analisada foi composta em sua maioria por mulheres acima dos 50 anos, com cirrose hepática ou neoplasias malignas em estágio avançado, com alta carga de morbimortalidade. Os resultados indicaram que a paracentese domiciliar é uma prática viável e segura e que, conforme a literatura, traz benefícios para o perfil de pacientes identificado no estudo. Com base nos resultados da pesquisa, espera-se fomentar e fortalecer a prática de realização de paracentese no domicílio em outros Serviço de Atenção Domiciliar do Brasil.

Palavras-chave: Paracentese; Ascite; Serviços de Atenção Domiciliar; Visita Domiciliar; Medicina de família e comunidade.

Resumen

Introducción: La paracentesis, un procedimiento para extraer líquido libre de la cavidad abdominal mediante una punción con aguja, es el tratamiento de elección para la ascitis de gran volumen y la ascitis refractaria. Además, existe consenso en la literatura de que este es un procedimiento con bajas tasas de complicaciones cuando se indica correctamente y lo realiza un profesional capacitado con la técnica adecuada. Sin embargo, hay pocos datos en la literatura sobre la realización de paracentesis en el hogar, a pesar de que documentos del Ministerio de Salud señalan la viabilidad de realizarla. **Objetivo:** Describir y analizar una serie de casos de paracentesis realizadas en domicilio en un Servicio de Atención Domiciliar (SAD), así como el perfil de los pacientes, las hospitalizaciones y las complicaciones del procedimiento. **Métodos:** Estudio transversal, documental y retrospectivo, revisando historias clínicas de pacientes ingresados en Servicio de Atención Domiciliar entre los años 2008 y 2022. Se incluyeron secuencialmente todos los pacientes sometidos a paracentesis domiciliar en el período. Para el análisis descriptivo y estadístico se utilizó el *software* Statistical Package for the Social Sciences. **Resultados:** La muestra estuvo compuesta por 47 pacientes, que ingresaron en el Servicio de Atención Domiciliar en 63 hospitalizaciones y se les realizaron 468 paracentesis en su domicilio. La edad promedio fue de 63,6 años y las neoplasias malignas fueron la principal causa de ascitis (53,2%), con un 73% de pacientes con un índice de comorbilidad de Charlson de riesgo alto o muy alto de mortalidad al año. Todos los procedimientos fueron realizados por médicos de familia y comunitarios. La mediana del número de paracentesis fue de 2 procedimientos por hospitalización (1-6) y la mediana del volumen drenado fue de 5 litros (4-7,5). La mitad de los pacientes que requirieron repetidas paracentesis se sometieron a un nuevo procedimiento dentro de los 8 días. En cuanto a las complicaciones, se describieron en el 4,7% de los procedimientos, siendo el 3,4% complicaciones mayores, como sangrado, infecciones, empeoramiento del cuadro clínico y de la función renal. Hubo 3 pacientes que fallecieron debido a incidentes que, combinadas con la gravedad de sus comorbidades, pueden estar relacionadas con complicaciones del procedimiento. **Conclusiones:** La población de estudio estuvo constituida mayoritariamente por mujeres, mayores de 50 años, con cirrosis hepática o neoplasias malignas en estadio avanzado, con alta carga de morbimortalidad. El estudio concluyó que la paracentesis en casa es una práctica viable y segura de realizar y, según la literatura, trae beneficios al perfil de paciente identificado en el estudio. Con base en los resultados de la investigación, se espera incentivar y fortalecer la práctica de la paracentesis domiciliar en otros Servicio de Atención Domiciliar de Brasil.

Palabras clave: Paracentesis; Ascitis; Servicios de Atención de Salud a Domicilio; Visita Domiciliar; Medicina Familiar y Comunitaria.

INTRODUCTION

Therapeutic paracentesis is a widely used procedure for managing cases of refractory or large-volume ascites. It is performed by inserting a needle into the abdominal cavity to remove excess free fluid, thereby providing relief from symptoms such as pain and dyspnea.¹ As described in the literature,

it has low complication rates when performed by a trained professional using proper technique and is traditionally performed in a hospital setting.²

However, changes brought about by the epidemiological and demographic transition — which have led to an aging population — as well as the debate regarding the limitations of the hospital-centered model of health care, have fostered a more humanized approach to care outside the hospital setting, one that is person-centered and seeks to preserve the patient's autonomy. In this context, Home Care has emerged, and with it, Home Care Services (HCS), which aim to provide care to patients with complex clinical and social conditions, thereby avoiding unnecessary hospital admissions. In many cases, these are patients with serious, advanced-stage illnesses requiring complex care and procedures, such as paracentesis.^{3–6}

The literature points to the feasibility of this procedure in a home setting, as outlined in the Ministry of Health's Home Care Handbook.⁵ Among the benefits of this practice are reduced stress associated with travel and waiting times at emergency departments, satisfactory symptom control at home, and reduced costs. However, there is still few data available in the literature regarding this practice in HCSs in Brazil.^{7–9}

The present study aims to describe and analyze the characteristics of a case series of paracentesis performed at home by a HCS, as well as the profile of patients who underwent the procedure and the associated complications, with the goal of promoting this practice in other HCSs in Brazil.

METHODOLOGY

This cross-sectional, descriptive, analytical, documentary, and retrospective study was conducted at the HCS of Grupo Hospitalar Conceição, in Porto Alegre, Rio Grande do Sul, Brasil, affiliated with the Ministry of Health's "Melhor em Casa" Program. The service serves an area with an assigned population of approximately 400,000 people, providing home care to patients referred from hospitals, urgent and emergency care services, or Basic Health Care Units (UBS), with a variety of health conditions, generally acute or exacerbated chronic conditions. The service's objective is to reduce hospitalizations, prevent readmissions, and facilitate the transition of care from the hospital setting to Primary Health Care (PHC).

The study included all patients over 18 years of age who underwent at least one home paracentesis during their admission to the HCS between 2008 and 2022. The admissions period began with the first home paracentesis performed by the service in 2008. To obtain the sample, a search was conducted in the service's own database, as well as a search for human albumin prescriptions in the service's electronic prescription system. Next, a comprehensive review of the physical and electronic medical records of the patients in the sample was performed, excluding those with no record of a home paracentesis procedure.

The collected data were entered into a Data Collection Form developed by the research team specifically for this study, based on a review of the available literature. The form includes sociodemographic and epidemiological data on the patient and the HCS admission, as well as information on the procedures themselves. All clinical adverse events that occurred within ten days following each paracentesis were also recorded, allowing for the analysis of potential complications.

Subsequently, the research team entered the data into Microsoft Excel and performed descriptive and statistical analyses using the Statistical Package for the Social Sciences (SPSS), version 18.0. The normality of the distribution of continuous variables was tested using the Shapiro-Wilk test; continuous variables with a normal distribution were presented as mean and standard deviation, while the others

were presented as median and interquartile range (25th and 75th percentiles). Categorical variables were expressed as absolute numbers and proportions.

This study was submitted for review to the local Research Ethics Committee and was approved under opinion no. 5,685,901, CAAE 62838522.1.00005530.

RESULTS

The sample consisted of 47 patients, who were monitored by the HCS during 63 home admissions and underwent a total of 468 home paracenteses. As shown in Table 1, the majority of the sample consisted of women (61.7%) and white individuals (74.5%). The mean age was 63.6 years (standard deviation ± 11.9), with more than half of the patients in the 50–69 age group. Most patients (80.9%) had only one HCS admission during which paracentesis was performed.

Table 1. Characteristics of the patients included in the study.

Variable		n	%
Sex	Female	29	61.7
	Male	18	38.3
Race/Skin color	White	35	74.5
	Black	9	19.1
	Brown	1	2.1
	Not reported	2	4.3
Age (years)	40–49	6	12.8
	50–59	13	27.7
	60–69	12	25.5
	≥ 70	16	34.0
Etiology of ascites	Liver cirrhosis	19	40.4
	Malignant neoplasms	25	53.2
	Heart failure	3	6.4
Number of HCS admissions involving paracentesis, per patient	Only 1	38	80.9
	2	5	10.6
	3	2	4.3
	4	1	2.1
	5	1	2.1
Total		47	100

HCS: Home Care Services.

Malignant neoplasms were the leading etiology of ascites among the patients included in the study, accounting for 53.2% of cases, followed by liver cirrhosis (40.4%) and heart failure (6.4%). More specifically, the neoplasms originated at the following primary sites, in descending order of frequency: liver, pancreas, stomach, biliary tract, colon, ovaries, genital tract, and breasts. Patients with liver neoplasms also had a history of liver cirrhosis, and patients with other neoplasms had metastatic disease, many with peritoneal carcinomatosis. Regarding liver cirrhosis, etiologies were predominantly viral, followed by alcohol-related, non-alcoholic steatohepatitis, primary biliary cirrhosis, drug-induced, chylous, and cryptogenic cirrhosis.

As described previously, these 47 patients together accounted for 63 admissions to the HCS, during which they underwent paracentesis at home, as some patients were admitted to the service on more than one occasion. Data extracted from the patients' admission records indicate that in nearly 45% of admissions, the International Classification of Diseases (ICD)-10 code referred to neoplasms, as shown in Table 2. Furthermore, the reasons for admissions — information also extracted from the admission records — were the need for paracentesis, home palliative care, and clinical follow-up.

Table 2. Characterization of the patients' reasons for admission.

Variable	n	%
ICD-10 code from the admission record, by chapter		
Neoplasms (Chapter II)	28	44.5
Endocrine, nutritional, and metabolic diseases (Chapter IV)	6	9.5
Diseases of the circulatory system (Chapter IX)	6	9.5
Diseases of the digestive system (Chapter XI)	17	27.0
Injuries, poisonings, and certain other consequences of external causes (Chapter XIX)	1	1.6
Not reported	5	7.9
Reason for HCS admission		
Clinical follow-up	14	22.2
Palliative care at home	22	35.0
Need for therapeutic paracentesis	25	39.7
Not reported	2	3.1
Total	63	100

ICD: International Classification of Diseases; HCS: Home Care Services.

To assess the severity profile of patients by admission, the Charlson Comorbidity Index (CCI) was used, which estimates the risk of mortality within one year based on the patients' comorbidities and age. The attending physicians entered these data into the system during the patients' admissions, which calculates the index and stores the information in the electronic medical record. As shown in Table 3, in nearly 40.0% of admissions, patients had a CCI classified as high-risk, and a similarly significant proportion of 34.9% had a CCI classified as very high-risk.

Table 3. Distribution of admissions to the Home Care Service according to the Charlson Comorbidity Index, by category.

Variable	n	%
Low (≤ 3 points)	3	4.8
Moderate (4–5 points)	14	22.2
High (6–7 points)	24	38.1
Very high (≥ 8 points)	22	34.9
Total	63	100

The median length of HCS admission was 43 days (IQR: 23–117), the median number of home visits per admission was 13 (IQR: 7–28), and the median number of paracenteses was two procedures per admission (IQR: 1–6). In most admissions, the procedure was performed only once (38.1%) or 2–5 times

(36.5%). However, in about one-quarter of the admissions, more than five paracenteses were performed, with up to 78 procedures performed during a single admission.

Finally, regarding the outcomes of these HCS admissions, a significant majority (66.7%) resulted in readmissions related to the patients' underlying conditions, most of which were emergency readmissions, as shown in Table 4. Nearly one-quarter of the admissions resulted in death at home (22.2%), and in 11.1% of cases, the patients were discharged due to clinical improvement, with the possibility of follow-up in Primary Health Care (PHC).

Table 4. Outcomes of Home Care Service admissions.

Variable	n	%
Clinical discharge	7	11.1
Elective readmission	6	9.5
Emergency readmission	36	57.2
Death at home	14	22.2
Total	63	100

All paracenteses were performed by family and community physicians and/or residents — in the latter case, under the supervision of preceptors — and assisted by a nursing professional. The technique used consisted of abdominal puncture with a 14-gauge peripheral catheter, performed after skin disinfection with 0.5% alcohol-based chlorhexidine and local anesthesia with 2% lidocaine without a vasoconstrictor. All procedures were performed “blind,” without the simultaneous use of abdominal ultrasound, and with the patients' consent. Only one of the patients had an intra-abdominal catheter implanted in a hospital setting, through which ascitic fluid was drained. Data on the paracenteses are shown in Table 5.

Table 5. Characteristics of the paracenteses.

Variable		n	%	Median
Drained volume	Up to 5 liters	230	49.1	5 liters
	>5L and ≤10L	184	39.3	
	>10L	28	6.0	
	No information	26	5.6	
Time interval between repeat paracenteses (days)	First or only paracentesis	67	14.3	8 days
	1–10	278	59.4	
	11–20	85	18.2	
	21–30	27	5.8	
	>30	11	2.3	
Total		468	100	

The median volume drained was 5 liters (IQR: 4.0–7.5). In 6% of the procedures, more than 10 liters were drained, and the highest recorded volume was 18 liters. Regarding intravenous albumin replacement, medical records indicated its administration in 79.9% of the procedures. Given that many patients required repeat paracentesis, the median time interval between these procedures was 8 days (IQR: 7–12).

In ten procedures — corresponding to just over 2% of cases — technical problems were recorded, including failed puncture, no ascites fluid output, or insufficient fluid drainage. In these cases, some patients were referred to the emergency department for an ultrasound-guided procedure, while for the remainder, a new attempt was made at home during a follow-up visit.

As shown in Table 6, in 95.3% of the procedures, no complications were recorded during the procedure or in the ten days following its completion. As for the complications described, they occurred in 22 paracenteses, corresponding to 4.7% of the procedures; 1.3% were minor, self-limiting complications that did not require specific medical intervention, such as leakage of ascitic fluid from the puncture site and pain or hematoma formation at the puncture site.

Table 6. Procedure-related complications.

Category	n	%
Procedures without complications	446	95.3
Procedures with complications	22	4.7
Minor complications:	6	1.3
Pain or discomfort at the puncture site	4	
Ascitic fluid leakage from the puncture site	1	
Hematoma/self-limited bleeding	1	
Major complications:	16	3.4
Suspected or confirmed abdominal infection	6	
Hepatic encephalopathy	5	
Nonspecific clinical deterioration	2	
Deterioration of renal function	2	
Massive bleeding	1	
Progression to death	3	0.64

In 16 procedures (3.4%), clinical complications were recorded within ten days following the paracentesis that required specific medical intervention and may be considered major complications, as described in the literature. Table 6 describes the complications and their frequency. Of these 16 complications, 11 required hospital-based management, while five were managed at home. Three patients died shortly after the procedure due to events that, combined with the severity of their underlying diseases, may have been exacerbated by the procedure; this figure corresponds to 0.64% of the procedures and 6.38% of the 47 patients included in the study.

It is worth noting that ten patients in the terminal stage of their illness died within ten days after the last paracentesis. Of these, seven died at home with support from the HCS team, and three were referred to the emergency department by their families. In these situations, it was not possible to determine, based on the data obtained from the medical records, whether the deaths were related to any complications of the procedure or whether they occurred as a result of the underlying disease.

DISCUSSION

In this case series, the profile of patients undergoing home paracentesis consisted primarily of individuals over 50 years of age, female, with advanced-stage neoplasms or liver cirrhosis, and with a high

burden of morbidity and mortality. In addition, most patients required repeat paracentesis, with a median time interval of eight days. Most admissions had an outcome of hospital readmission, which is consistent with the high rate of comorbidity. Nearly a quarter of the patients included in this study died at home with the care team present.

Considering that patients requiring therapeutic paracentesis are mostly patients with serious illnesses who are often frail due to their underlying condition and meet the criteria for palliative care, it is essential to reduce stressors and focus on symptom management and quality of life. Thus, as noted in the literature, the possibility of performing paracentesis at home is highly beneficial, given that there is no need to travel to hospitals or emergency departments.^{2,5-9} In addition, home care optimizes the use of financial resources by replacing or reducing the duration of hospital stays.^{3,6}

A case series by Ota, Schultz and Segaline⁷ described paracenteses performed at home by a mobile palliative care consultation service in the United States (U.S.). A total of 30 patients participated in the study, and 42 paracenteses were performed. The study concluded that home paracentesis is safe and provides effective palliation of related physical symptoms, given that all patients experienced relief from symptoms such as pain and dyspnea after the procedure. Furthermore, the study suggests that the option of performing paracentesis at home may also provide some psychological relief to the patient, as it eliminates the physical and emotional stress associated with transportation and staying in healthcare facilities such as emergency rooms and hospitals.

Similarly, a study by Machado et al.,⁸ which analyzed data related to therapeutic paracentesis at home in patients receiving care from a HCS in southern Brazil, indicated that home paracentesis can contribute to the quality of life of patients in palliative care by avoiding travel and waiting times at emergency departments. In another study, Zama and Edgar⁹ described five cases of patients receiving palliative care who underwent paracentesis at home, also in the United States, and reached the same conclusions regarding reduced patient stress, symptom control, and the safety of the procedure in a home setting.

It is known that complications increase with high-volume paracentesis; however, although more than 45% of the paracentesis procedures in this study drained volumes exceeding 5,000 mL, complications were reported in only 22 procedures, corresponding to 4.7% of the total. A prospective study by Gottardi et al.,² which analyzed 515 paracenteses performed in 171 patients with cirrhosis, found a higher complication rate of 10.5%. Of these, 8.9% were minor complications, and only eight procedures presented major complications requiring specific medical intervention. Two of the patients followed died as a result of complications, representing less than 0.5% of cases — a percentage close to that found in the present study (0.64%). It is worth noting that the present study included not only patients with cirrhosis but also patients with cancer in advanced stages of the disease. Furthermore, this low complication rate is consistently reported in the literature, leading to the conclusion that the procedure can be safely performed by any physician who has received adequate training, and that serious complications are extremely rare when the procedure is performed using the correct technique.^{1,2,7,8,10}

In the home setting, however, data remain limited. Machado et al.⁸ analyzed 48 procedures performed on 15 patients who were also receiving care from a HCS. There was only one case of a post-procedure complication, involving minor, self-limiting bleeding at the puncture site. Another study, published in 2021, described 30 paracenteses performed at home in 30 patients, with all procedures being ultrasound-guided. All patients reported relief from symptoms caused by large-volume ascites after the procedure, and no related complications were reported.⁷ Finally, Zama and Edgar⁹ described 12

procedures performed in six patients receiving palliative care, four of whom had cancer. No complications were reported after the procedure. All articles point to the need for studies with larger populations. In this regard, this research is innovative in that it includes a population of 47 patients and 468 paracenteses performed at home, which may represent the largest series of this procedure in a home setting available in the literature to date.

CONCLUSION

This study represents one of the largest case series of home paracentesis available in the literature. It identified the profile of patients undergoing home paracentesis and described the procedures and related complications. The study population consisted of elderly patients with high morbidity and mortality rates, many of whom were receiving palliative care — circumstances in which, according to the literature, performing paracentesis at home enables a better quality of life for both patients and caregivers.

Furthermore, therapeutic paracentesis at home proved to be a safe practice, reducing avoidable and exhausting trips to urgent care/emergency departments, provided it is performed by professionals properly trained to carry out the procedure, following the routine and technique established by the HCS.

Finally, the motivation for presenting this study stems from the recognition of the need to expand the availability of therapeutic paracentesis for patients receiving home care, with the aim of optimizing healthcare resources and promoting a better quality of life for patients. Based on the experience of an HCS, this study was able to demonstrate the feasibility of performing paracentesis at home; consequently, it is hoped that this practice will be promoted in other similar services.

CONFLICT OF INTERESTS

Nothing to declare.

AUTHORS' CONTRIBUTIONS

RCG: Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Visualization, Writing—original draft. MOI: Conceptualization, Data curation, Writing—original draft. SJM: Conceptualization, Supervision, Visualization, Writing – review & editing. GEB: Conceptualization, Supervision, Formal Analysis, Writing – review & editing.

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