



# Perceptions, awareness, and implementation surrounding the assessment of frailty amongst vascular surgeons in Italy: Results from a nationwide cross-sectional survey

Vascular  
2024, Vol. 0(0) 1–8  
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DOI: 10.1177/17085381241257740  
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## Abstract

**Objectives:** We conducted this survey to gain insight into the real-life application and perceptions regarding the importance of peri-operative frailty assessment amongst vascular surgeons in Italy.

**Methods:** Italian vascular surgeons were invited to participate in the survey using the list provided by the Italian Society for Vascular and Endovascular Surgery (1050 invited participants). A dedicated link to the survey was emailed through Google Forms, and reminders were automatically sent on a bi-weekly basis for a total of 8 weeks before stopping data collection.

**Results:** The survey was completed by 225 respondents, thereby yielding an overall 21.5% response rate. While the vast majority of respondents stated they were aware of the meaning of frailty (93%) and agreed that its assessment was clinically relevant for patients undergoing vascular surgery (99%), only 44% of surveyed surgeons reported that they used a specific tool for peri-operative frailty assessment. However, most respondents indicated that routine evaluation of frailty was not performed at their institution (87%). The main limitations were identified as being the lack of confidence in choosing the best tool, followed by lack of awareness, lack of skilled operators, and lack of time.

**Conclusions:** Our study showed that whilst most vascular surgeons in Italy are aware of the importance of frailty in affecting surgical outcomes across various interventions in the elective and non-elective settings, there is poor implementation of formal frailty assessment.

## Keywords

Survey, vascular surgery, endovascular interventions, frailty

## Introduction

Vascular surgery is increasingly undertaken in an older population, that is becoming even more increasingly frail or at a significant risk for frailty-related complications. Frailty is defined as “a condition characterised by loss of biological reserve, failure of physiological mechanisms and vulnerability to a range of adverse outcomes including increased risk of morbidity, mortality and loss of independence in the peri-operative period.”<sup>1</sup> In fact, frailty has become the subject of much research lately as its presence and severity may substantially contribute to important clinical events that can complicate the admission of older surgical patients, diminish the patients’ and caregivers’ quality of life (QoL),

and increase direct as well as indirect healthcare costs.<sup>2</sup> Therefore, the prevalence and degree of frailty should

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always be assessed and the patients' status optimised, whenever clinically feasible, in order to improve post-operative outcomes.<sup>3,4</sup> Furthermore, implementation of frailty in the peri-operative and post-operative decision making could alter management strategies or follow-up protocols, further highlighting the pivotal role of frailty recognition for modern surgical care.

Over the last years, different models have emerged, such as the orthogeriatric services, to enhance care for elderly surgical patients. For instance, in Britain, the Guys and St Thomas NHS Trust started to develop the "Perioperative medicine for older people undergoing surgery" (POPS) model already back in 2003.<sup>5</sup> This model provides a geriatrician-led service using Comprehensive Geriatric Assessment (CGA) and optimisation methodology delivered by a multidisciplinary team, with the aim to improve peri-operative outcomes. However, a survey that was conducted in 2019 also showed that less than a quarter of NHS trusts had successfully implemented the model across surgical specialties. Alternative pathways of care have been proposed, such as the so-called hospitalist approach, which entails the co-management of surgical patients by a surgeon and a dedicated hospitalist such as a specially trained anaesthesiologist or physician who is dedicated to the general medical care of hospitalised patients. Furthermore, the British Geriatrics Society and Centre for Perioperative Care recently published guidelines assessing the need for frailty assessment and ways to achieve a multidisciplinary approach to peri-operative management of frail surgical patients.<sup>1</sup> However, the reach of such guidelines within and outside of the UK is not known, while the situation is further complicated by the absence of dedicated indications from international vascular surgery societies.<sup>6-8</sup>

On the basis of this multifaceted scenario, we conducted this survey to gain insight into the real-life application and perceptions regarding the importance of peri-operative frailty assessment amongst vascular surgeons in Italy. The study specifically aimed to determine (i) what is the awareness on the theme of frailty and what practices are currently implemented for assessment or optimisation of frail patients undergoing elective and emergency vascular surgery; (ii) what are vascular surgeons' opinions and perceptions about frailty and its impact on peri-operative outcomes; (iii) what are the main obstacles to implementing comprehensive peri-operative management for frail patients admitted to vascular units.

## Methods

Italian vascular surgeons were invited to participate in the survey using the list provided by the Italian Society for Vascular and Endovascular Surgery (1050 invited participants). The survey consisted of 29 questions as detailed in [Supplemental Table I](#). A dedicated link to the

survey was emailed through Google Forms, and reminders were automatically sent on a bi-weekly basis for a total of 8 weeks before stopping data collection. Descriptive and univariate analyses were performed using contingency tables with Fisher exact test and two-tailed  $p$ -values for categorical data and a paired  $t$  test with two-tailed  $p$ -values for continuous data. A  $p$ -value of  $<0.05$  was considered statistically significant. The self-administered questionnaire contained a mixture of multiple-choice and five-point Likert-style questions. Some questions allowed participants to select multiple responses and provide free text answers. All data were anonymously collected and de-identified for analysis. Ethical committee approval was waived. The study was developed and conducted following the CROSS principles for reporting of survey studies.

## Results

### *Participants' characteristics*

The survey was completed by 225 respondents, thereby yielding an overall 21.5% response rate. Baseline demographics of responders are reported in [Table 1](#). Briefly, 64% were of male gender and 63% practiced at academic hospitals. Consultant surgeons comprised 66% of the overall cohort. All those who responded to the survey completed all questions.

### *Perceptions of the concept of frailty*

While the vast majority of respondents stated they were aware of the meaning of frailty (93%) and agreed that its assessment was clinically relevant for patients undergoing vascular surgery (99%), only 44% of surveyed surgeons reported that they used a specific tool for peri-operative frailty assessment ([Table 2](#), [Figure 1](#)).

### *Frailty assessment practices*

Most surgeons agreed that frailty evaluation would be relevant for both males and females (86%) and that its assessment would impact on both the decision to operate as well as the surgical strategy (92%). Surveyed physicians were also asked who, in their opinion, should evaluate frailty and provided mixed responses: 42% answered this would be the responsibility of the vascular surgeon while 26% and 18% answered that a geriatrician or an anaesthesiologist, respectively, should be performing the evaluation. However, most respondents indicated that routine evaluation of frailty was not performed at their institution (87%). Also, there was a general agreement that guidelines should incorporate recommendations for frailty evaluation (92%), and the majority of surgeons showed interest for

**Table 1.** Respondent demographics.

		N	% Of respondents
Age range	25–30 yo	48	21.3%
	31–35 yo	62	27.6%
	36–40 yo	24	10.7%
	41–45 yo	25	11.1%
	>45 yo	66	29.3%
Gender	Female	81	36%
	Male	144	64%
Type of hospital	Academic	142	63.1%
	Non-academic	83	36.9%
Level of training	Resident	76	33.8%
	Consultant	149	66.2%
Area of interest	Open surg.	105	46.7%
	Endovascular surg.	91	40.4%
	Venous surg.	7	3.1%
	US imaging	4	1.8%
	Wound care	0	0
	Clinics	9	4.0%

research on the topic of frailty (75%). Subgroup analysis showed that males had a higher perception of the concept of frailty than females (96% vs 88%, respectively,  $p = .04$ ), whereas consultant surgeons and physicians working in academic hospitals were more frequently aware of tools to measure frailty than trainees and physicians working in non-academic hospitals, respectively (50% vs 30.5%,  $p = .004$  for medical role; 50% vs 33.5%,  $p = .01$  for type of hospital).

### **Impact of frailty assessment on outcomes and on clinical decision making**

As for the outcomes affected by frailty (Figure 2), a general agreement emerged on the importance of frailty among all items; in particular, most respondents agreed that frailty would greatly affect mortality and quality of life. Worthy of attention, a large proportion of surveyed physicians agreed that frailty would affect readmissions, falls risk, complications, and length of stay. As expected, there was a correlation between the complexity of disease and/or intervention, and the perceived importance of frailty evaluation (Figures 3 and 4). For instance, the exceeding majority of surveyed physicians rated fenestrated-branched endovascular aortic repair and open aortic repair to be extremely impacted by frailty. Similarly, abdominal and thoracoabdominal aortic aneurysms were the disease categories for which respondents felt that frailty assessment would bear the most prominent importance. Lastly, physicians were asked to identify the main challenges to overcome in order to implement frailty assessment in clinical practice. The main limitations were identified as being the lack of confidence in choosing the best tool,

followed by lack of awareness, lack of skilled operators, and lack of time (Figure 5).

## **Discussion**

Frailty is a multidimensional syndrome that reflects a state of decreased physiologic reserve resulting in vulnerability to stressors, be they pathologic or iatrogenic, as in the case of surgery. Although frailty has been historically referred to as a geriatric syndrome, it is now clear that not all older patients are frail and that not all frail patients are elderly. As evidence accumulates that chronologic age is an imprecise indicator of health status, the frailty syndrome can be broadly viewed as the manifestation of accelerated and/or unsuccessful biologic aging. Much research has recently focused on the impact of frailty on selected outcome measures, with the strongest evidence found for the correlation between 30-day mortality and frailty. Therefore, it would follow that preoperative frailty assessment can potentially be clinically useful in helping practitioners predict and guide the pre-, peri-, and post-operative management of frail subjects with vascular disease and/or undergoing vascular interventions. Nonetheless, significant barriers still exist that preclude broad implementation of frailty assessment in clinical practice.

In particular, substantial heterogeneity in frailty assessment has been demonstrated, as many tools exist but no consensus is currently available to guide their selection. Furthermore, other logistic barriers may exist, which may not be easily identified from available studies. To our knowledge, this is the first study amongst vascular surgeons from a national perspective focussing on awareness of and barriers to frailty assessment. This study has demonstrated that frailty is certainly under-assessed and likely undertreated, despite a satisfactory level of awareness of the frailty syndrome. Indeed, even though almost all respondents agreed that frailty influences outcomes in vascular surgery patients (and more so for more complex diseases and/or interventions), only a small proportion routinely assessed it, mainly due to insufficient knowledge regarding perioperative frailty assessment and lack of staff or time. Although it can sometimes be argued that frailty assessment cannot influence clinical practice, especially in the emergency setting or when alternative therapeutic options may not be readily available. However, we also feel that patients who clearly are too frail for major interventions and have anticipated poor life-expectancy may be considered for palliative comfort care treatment instead of invasive treatment, as any major intervention would be unlikely to result in a meaningful impact on the patient's quality of life.

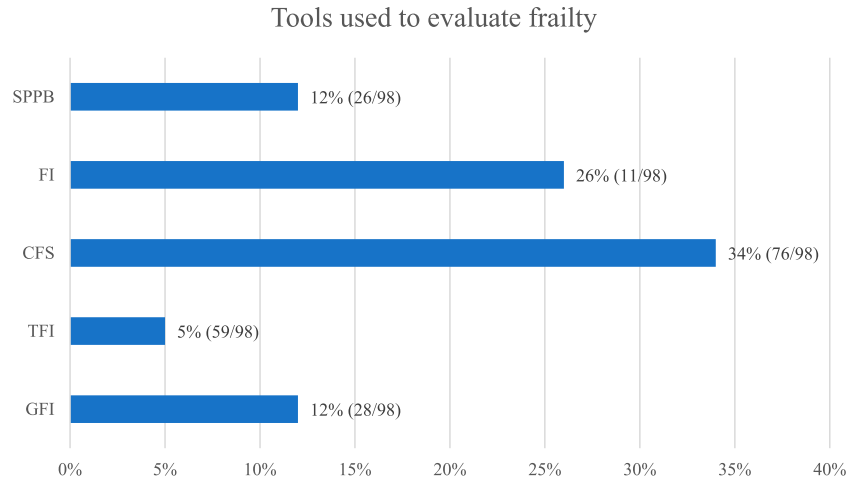
Our results also seem concordant with prior evidence, pointing towards poor knowledge of the various tools that

**Table 2.** Survey results.

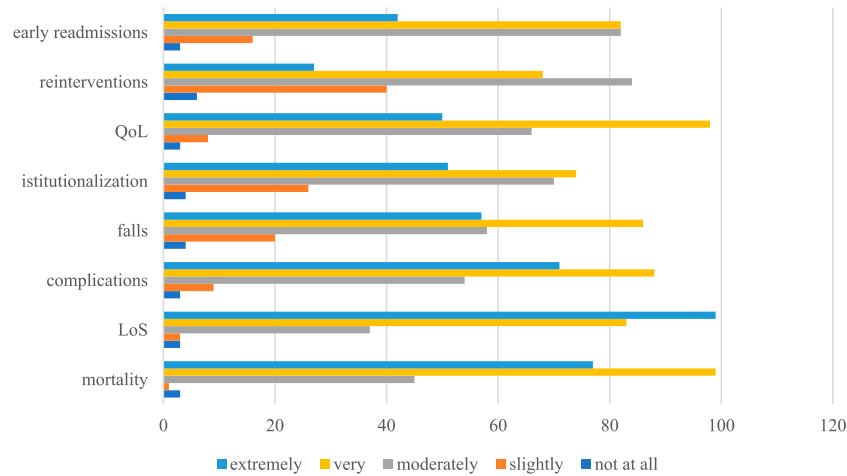
		N	% Of respondents
Meaning of frailty	Yes	210	93
	No	15	7
Tools to evaluate frailty	Yes	98	44
	No	127	56
Frailty evaluation vasculopathic patient	Yes	222	99
	No	3	1
Frailty evaluation in male/female	Male	18	8
	Female	13	6
	Both	194	86
Elective vs urgent/emergent	Elective	118	52
	Urgent/emergent	17	8
	Both	90	40
Operate or not vs surgical strategy	Operate or not	10	4
	Surgical strategy	7	3
	Both	208	92
Frailty evaluation: Who should do it?	General practitioner (GP)	14	6
	Vascular surgeon	95	42
	Vascular physician	15	7
	Geriatrist	58	26
	Anaesthetist	40	18
	Physiatrist	1	0.5
	Nurse	2	1
At your department routine evaluation?	Yes	61	27
	No	164	73
Frailty evaluated in urgent/emergent setting?	Yes	30	13
	No	195	87
If had a dedicated tool, would you use it?	Always	143	64
	Only in election	82	36
At your department is QoL evaluated routinely?	Yes	66	29
	No	159	71
When do you think frailty evaluation is more useful?	Before surgery	158	70
	After surgery	0	0
	Both	67	30
Frailty evaluation could affect the FU-programme?	No	79	35
	Different timing	123	55
	Stop follow-up (FU)	23	10
Do you know what sarcopenia means?	Yes	205	91
	No	20	9
If yes, could sarcopenia be a valid marker of frailty?	Yes	151	74
	No	54	26
Should GLs suggest a mandatory frailty evaluation?	Yes	208	92
	No	17	8
Would you be interested in research on frailty?	Yes	168	75
	No	57	25

are available for frailty assessment. It is reasonable to assume that the abundance of so many scoring schemes supported by heterogeneous scientific evidence may justify their weak use. Future research could be key to assess the best scoring systems and clarify where they are useful. However, key barriers for those who did not assess frailty also included staff being unsure of whose responsibility it is to do so, lack of appropriately trained

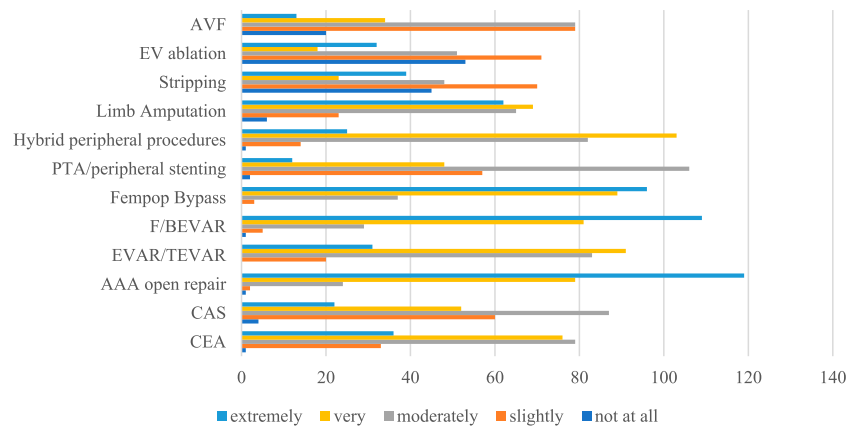
staff, as well as lack of time to complete the assessment. In this context, future guidelines may clarify how to perform frailty scoring, what stage of admission and by whom it must be done, and help guide pre-operative optimisation. The emergence of novel artificial intelligence systems and machine learning algorithms may also have a beneficial role to play in the identification of frailty in the future.



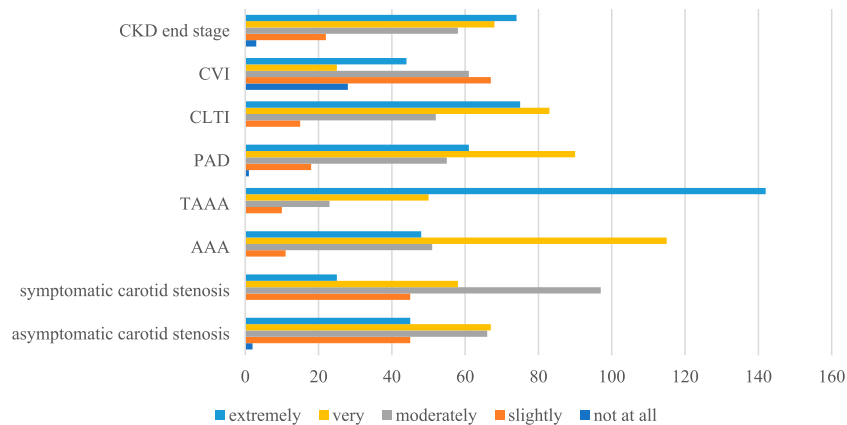
**Figure 1.** Tools used to evaluate frailty. SPPB: short physical performance battery; FI: frailty index; CFS: clinical frailty scale; TFI: Tilburg frailty indicator; GFI: Groningen frailty index.



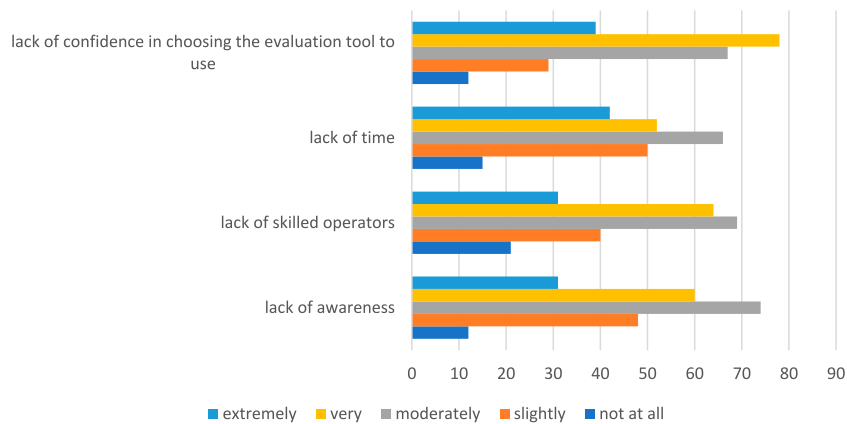
**Figure 2.** “How much do you think frailty can affect the following outcomes?” (QoL: quality of life; LoS: length of stay).



**Figure 3.** “Which intervention planning do you think frailty evaluation is important for?” (AVF: arteriovenous fistula; EV: endovenous).



**Figure 4.** “How much do you think is important to evaluate a patient affected by...” (CKD: chronic kidney disease; CVI: chronic venous insufficiency; CLTI: chronic limb threatening; PAD: peripheral artery disease; TAAA: thoracoabdominal aortic aneurysm).



**Figure 5.** “Why is not frailty routinely evaluated in urgent/emergent setting at your department?”

Sarcopenia or the loss of skeletal muscle quality and/or quantity has recently been shown as a potential surrogate marker for frailty that could complement the decision-making process. The recent increasing interest in the assessment of sarcopenia<sup>9,10</sup> and its prognostic impact for vascular patients, especially those undergoing endovascular surgery, could be related to the fact that the dataset needed to ascertain the quality of skeletal muscle(s) is usually available at the index procedure as most patients undergo contrast-enhanced cross-sectional imaging, thereby making the assessment of sarcopenia time- and cost-effective. Recent reviews have shown that, despite the heterogeneity in the methods used for its definition, which could render a cross comparison of clinical reports challenging, sarcopenia is highly prevalent among patients scheduled for vascular procedures and sarcopenic patients will frequently have worse outcomes, as compared with their non-sarcopenic counterparts during the short- as well as the long-term follow-up. However, evaluation of sarcopenia still remains mainly in the realm

of translational research, as further evidence is needed to identify the best method for its assessment and to draw definitive conclusions on its relative value versus conventional frailty scoring tools.

### Study limitations

Findings from this study must be interpreted within the context of its intrinsic limitations. First, the response rate and sample size may have limited this analysis, and perhaps with a larger sample size, additional risk factors would have been statistically significant with risk adjustment upon stratification of the cohort. However, other surveys amongst the vascular workforce have recently yielded similar response rates.<sup>11</sup> Also, there may have been a response bias as those with better knowledge of the topic may have been more willing to answer the survey questions; therefore, this may have impacted the results with a potential overestimation of trends through a response bias. Furthermore, this survey only represents a “snapshot” of status at a specific

time, while further longitudinal sampling could potentially prove important to provide additional insight into the scope of the problem.

## Conclusions

Our study showed that whilst most vascular surgeons in Italy are aware of the importance of frailty in affecting surgical outcomes across various interventions in the elective and non-elective settings, there is poor implementation of formal frailty assessment, and the key barriers to this seem to be lack of knowledge about scoring tools, lack of trained staff and dedicated resources, as well as uncertainty around whose responsibility it is. Validation of risk scoring for frailty assessment in vascular surgery and establishment of multidisciplinary teams are of paramount importance to make the best possible decisions for the patient and with the patient or his caregivers. The present study could encourage vascular units to embrace better models of care for frail elderly patients and advocate for the development of more comprehensive guidelines regarding frailty management in the vascular surgical setting.

## Acknowledgements

Study Collaborators (in alphabetical order for PubMed indexing.): Ailin Belloni, Alberto Guagliano, Alberto Pecchio, Alberto Settembrini, Alberto Varriale, Aldo Musilli, Alessandra Fittipaldi, Alessandro de Troia, Alessandro Ucci, Alessia D'Andrea, Alfonso Casalino, Andrea Melloni, Andrea Preziosi, Andrea Vacirca, Andrea Xodo, Anna Boscolo Meneguolo, Antonella Biello, Antonino Scolaro, Antonio Bozzani, Antonio Freyrie, Antonio Nicola Giordano, Arianna Pignataro, Armando Palmieri, Barbara Praquin, Beatrice Grando, Brigida Biancofiore, Domenico Brunetto, Bruno Amato, Carlo Setacci, Carlo Stringari, Caterina Melani, Cecilia Avelluto, Chiara Carluccio, Claudio Bianchini Massoni, Daniela Mazzaccaro, Daniele Bissacco, David Russo, Davide Esposito, Davide Mastroianni, Davide Turchino, Domenico Milite, Edoardo Forcella, Edoardo Pasqui, Elda Chiara Colacchio, Elisa Lazzeri, Elisa Piscitello, Elisabetta Tanda, Emanuele Bonfiglio, Emiliano Chisci, Enrico Cieri, Enrico Franceschini, Eugenio Martelli, Fabio Massimo Oddi, Federica Maria Castellana, Federico Villa, Francesca Sperti, Francesco Andreoli, Francesco Canovaro, Francesco Gonfiantini, Francesco Maria Lombardi, Francesco Riccitelli, Francesco Setacci, Gabriele De Donno, Gabriele Piffaretti, Gaetano Lanza, Gallo Francesco, Gemmi Sufali, Gian Franco Veraldi, Gianluca Ceccanei, Gianluigi Fino, Giovanni Mastrangelo, Giulia Baldazzi, Giulia Bertagna, Giulia Ferrante, Giulia Moretti, Giulio Accarino, Giuseppe Giuffrè, Gladiol Zenunaj, Guido Gloria, Ilaria Rotiroti, Ilenia Di Sario, Laura Paperetti, Leonardo Pasquetti, Leonidas Azas, Lorenzo Grosso, Lorenzo Mortola, Luca Cimoli, Luca Galassi, Lucia Di Stefano, Ludovica Ettore, Marco Franchin, Marco Panagrosso, Margherita Messina, Maria Federica Finelli, Maria Pia Borrelli, Maria Teresa Occhiuto, Marianna

Mucignat, Marianna Peruffo, Marianna Sallustro, Mario Efrain Rios Ramírez, Marta Mari, Massimo Ruggiero, Mattia Migliari, Michaela Lombardi, Michelle Bertagnolli, Nicola Troisi, Nikolakopoulos Knostantinos, Noemi Baronetto, Paolo Perini, Pasqualino Sirignano, Patrizia Dalla Caneva, Perla Persechini, Pierfrancesco Frosini, Pietro Modugno, Rachele Petroni, Raffaele Ammollo, Raffaello Bellosta, Roberto Chiappa, Roberto Gabrielli, Rossella Di Domenico, Sandro Irsara, Santi Trimarchi, Sara Alievi, Sara Speziali, Serena De Blasis, Serena Pisanello, Sergio Zacà, Simona Sica, Simone Cuzzo, Stefano Bartoli, Stefano Bonardelli, Turriziani Valerio, Vittorio Alberti, and Wassim Mansour.

## Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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## Supplemental Material

Supplemental material for this article is available online.

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