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Short-Term Concerns Primarily Determine Patient Preference for Abdominal Aortic Aneurysm Repair[☆]



James McAndrew Jones, BA,^{a,**} Yiyuan David Hu, BA,^{a,**}
 Mark Anthony Eid, MD,^{b,c} Catherine J. Sensenig, BA,^d
 Kunal S. Mehta, MD,^c Jenaya L. Goldwag, MD,^c
 Jonathan Aaron Barnes, MD,^c Ravinder Kang, MD,^b Michael J. Barry, MD,^e
 Emily L. Spangler, MD,^f Peter R. Nelson, MD,^{g,h} Lisa Mureebe, MD, MPH,ⁱ
 Gale L. Tang, MD,^j Elizabeth Tzeng, MD,^k Olamide Alabi, MD,^q
 Vivienne J. Halpern, MD,^l David H. Stone, MD,^b Benjamin S. Brooke, MD,
 PhD,^m Kayla Moore, BS,^a Peter Henke, MD,ⁿ Salvatore Scali, MD,^o
 J. O'Connell, MD,^p and Philip P. Goodney, MD^{b,c,*}

^aThe Geisel School of Medicine at Dartmouth College, Hanover, New Hampshire

^bDepartment of Surgery and VA Outcomes Group, White River Junction VA Medical Center, Geisel School of Medicine at Dartmouth, Hanover, New Hampshire

^cDepartment of Surgery and VA Outcomes Group, White River Junction VA Medical Center, White River Junction, Vermont

^dSmith College, Northampton, Massachusetts

^eMassachusetts General Hospital Center for Shared Decision Making, Boston, Massachusetts

^fBirmingham VA, Birmingham, Alabama

^gMuskogee VAMC, Muskogee, Okla

^hTampa VAMC, Tampa Bay, Florida

ⁱDurham VAMC, Durham, North Carolina

^jSeattle VAMC, Seattle, Washington

^kPittsburgh VAMC, Pittsburgh, Pennsylvania

^lPhoenix VAMC, Phoenix, Arizona

^mSalt Lake City VA, Salt Lake City, Utah

ⁿAnn Arbor VAMC, Ann Arbor, Michigan

^oGainesville VAMC, Gainesville, Florida

^pLos Angeles VAMC, Los Angeles, California

^qAtlanta VAMC, Atlanta, Georgia

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* Corresponding author: Philip P. Goodney MD, MS, Section of Vascular Surgery, 3V, Dartmouth-Hitchcock Medical Center, One Medical Center Drive, Lebanon, NH 03756

E-mail address: Philip.p.goodney@hitchcock.org (P.P. Goodney).

** JMJ and YDH contributed equally to this manuscript and share first authorship

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ABSTRACT

Introduction: Abdominal aortic aneurysm (AAA) repair may be performed through open or endovascular approaches, but the factors influencing a patient's repair-type preference are not well characterized. Here we performed a qualitative analysis to better understand factors influencing patient preference within the Preference for Open Versus Endovascular Repair of AAA Trial.

Methods: Open-ended responses regarding primary ($n = 21$) and secondary ($n = 47$) factors influencing patient preference underwent qualitative analysis using the constant comparative method with iterative reviews. Codes were used to generate themes and themes grouped into categories, with each step conducted via consensus agreement between three researchers. Relative prevalence of themes were compared to ascertain trends in patient preference.

Results: Patient responses regarding both primary and secondary factors fell into four categories: Short-term concerns, long-term concerns, advice & experience, and other. Patients most frequently described short-term concerns (23) as their primary influence, with themes including post-op complications, hospitalization & recovery, and intraoperative concerns. Long-term concerns were more prevalent (20) as secondary factors, which included themes such as survival, and chronic management. The average age of patients voicing only long-term concerns as a primary factor was 11 years younger than those listing only short-term concerns.

Conclusion: Short-term concerns relating to the procedure and recovery are more often the primary factor influencing patient preference, while long term concerns play a more secondary role. Long-term concerns are more often a primary factor in younger patients. Vascular surgeons should consider this information in shared decision making to reach an optimal outcome.

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Introduction

Surgical repair of abdominal aortic aneurysm (AAA) may proceed through either open or endovascular means. The less-invasive endovascular AAA repair (EVAR) procedure repeatedly shows short term advantages in recovery, morbidity and mortality over open surgical repair (OSR), but these benefits come with drawbacks.^{1–4} EVAR requires mandatory lifelong surveillance, and re-intervention is required at four years in nearly 20% of cases.^{5–7} Large randomized trials conducted to compare EVAR showed early survival benefits of EVAR were not sustained over time, and demonstrated other important differences without establishing a single method that is best for all patients.

Given the important differences in recovery time, surveillance and re-intervention rates between procedures, a shared decision-making framework between patients and physicians can help ensure alignment of patient goals and medical outcomes.^{8,9} The Preferences for Open Versus Endovascular Repair of Abdominal Aortic Aneurysm (PROVE-AAA) Trial seeks to test a two-part hypothesis in regards to shared decision making.¹⁰ First, patients who are well informed of the risks and benefits of both OSR and EVAR will express a preference for specific, measurable reasons. Second, patients who are well informed of these risks and benefits will be more likely to receive the type of repair that aligns with their preferences.^{11–13} The PROVE-AAA Trial is designed to quantitatively address these hypotheses.

The aim of this study is to better understand factors influencing patient preference for repair type based on qualitative analysis of open-ended patient comments on the PROVE-AAA questionnaire. As part of this survey, patients provided comments regarding both the primary factor and secondary factors which influenced their preference for EVAR or OSR. Through qualitative analysis we identified common themes and categories presented here to provide vascular surgeons with additional perspective to improve the shared decision-making process.

Methods

PROVE-AAA trial

The PROVE-AAA trial is a multi-center, cluster randomized controlled trial which enrolled 235 veterans from 23 geographically diverse centers in the Veterans Administration system. Selected study sites had a surgical volume of at least 20 AAA repairs annually. Enrolled Veterans had a AAA measuring at least 5.0 cm in anterior-posterior diameter, and were both anatomical and physiological candidates for both OSR and EVAR. Detailed description of study design and aims was described by Columbo et al.¹⁰ The PROVE-AAA trial was granted Central Institutional Review Board approval by the Veteran's Health Administration and registered at ClinicalTrials.gov (www.clinicaltrials.gov NCT03115346). The use of patient responses in this qualitative analysis fell within the

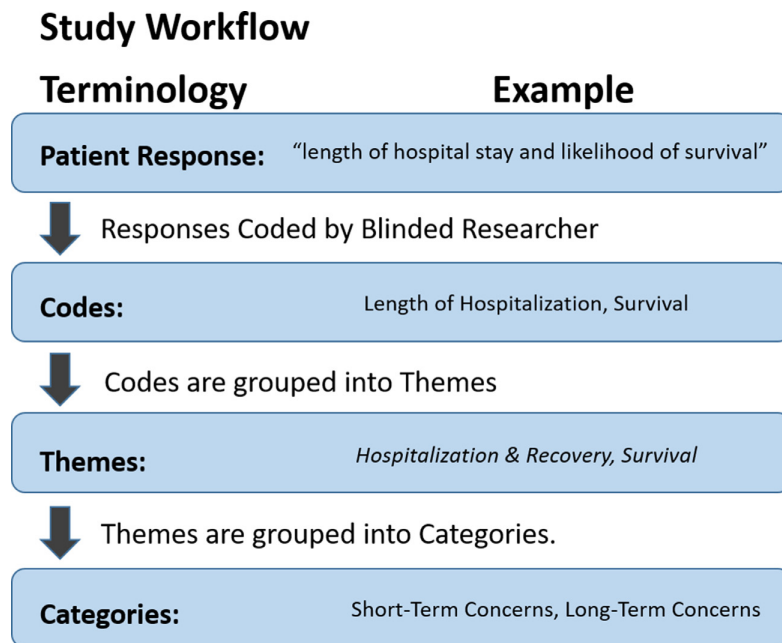


Fig. 1 – Study Workflow & Terminology. The constant comparative method with iterative reviews was used to distill patient responses into themes and categories. Each step was done via consensus agreement.

scope of informed consent obtained during patient enrollment in the PROVE-AAA trial.

Collection of survey data

Veterans enrolled in the PROVE-AAA trial were given a survey to assess their preference for repair type during their first clinic visit to vascular surgery after enrollment. As part of this, select questions contained an open-ended response box if respondents chose to provide further information. Digitized transcriptions of these answers were generated by individual study site coordinators as part of the overall PROVE-AAA dataset.

Generation of codes, themes & categories

This qualitative study used the constant comparative method with iterative reviews to identify and categorize themes in two open response fields related to factors influencing patient preference. A graphical overview of the workflow is provided in [Figure 1](#).

Anonymized transcriptions of patient responses were imported into Microsoft Excel and a team of three blinded researchers (AJ, CS, YH) conducted qualitative analysis using the constant comparative method with iterative review. In the first phase, data was independently coded by each researcher using an inductive, semantic approach. These codes were then reviewed during group meetings and unified into a single coded dataset (i.e. “codebook”) via consensus agreement on the coding of individual responses. In the next phase,

this coded data was used to generate and define a set of themes for each question via consensus agreement. Based on the emerging trends in the codebook, each researcher independently generated a list of themes and these themes were reviewed and defined by the team to create a common list of themes. Each code was then assigned a mutually exclusive theme via consensus agreement. Any disagreements were settled via discussion and/or revision of themes with a master arbiter (ME). In the final step, the themes themselves were grouped into common, overarching categories to allow for semi-quantitative comparisons. [Table 1](#) lists a representative sample of direct patient quotes regarding both primary and secondary concerns and includes the themes and overarching categories of each quote. Generation of codes, themes and categories was conducted using Microsoft Excel. All qualitative analysis for the manuscript was developed and written adhering to the COREQ guidelines where applicable.¹⁴

Patient age analysis

Amid emerging themes of short-term and long-term concerns, we hypothesized that patients of differing ages may prioritize these differently. We therefore isolated all patients whose responses could be wholly categorized as either short-term or long-term (with no overlap) and quantitatively performed statistical analysis of the age of participants relative to their procedural preferences. All statistical analysis was conducted using Stata statistical software (StataCorp; College Station, TX).

Table 1 – Representative sample of patient comments used for qualitative analysis.

	ID	Comment	Themes	Categories
<i>Main Factor Influence Preference</i>	1302	feel like the doctors could see what they are doing better	Intraoperative concerns	Short-term concerns
	1307	no worries at all. Allergy to morphine	Intraoperative concerns, Post-op complications	Short-term concerns
	1008	Because of the possibility that the stent could move, I'm less inclined to do it	Post-op complications	Short-term concerns
	0410	Preffered[sic.] open due to 'done with follow ups'	Chronic Management	Long-term concerns
	1802	I don't want to die (main concern)	Survival	Long-term concerns
	0412	Bad experience with friends open repair	Non-medical advice/experience	Advice/experience
	1507	length of hospital stay and likelihood of survival	Hospitalization & recovery, Survival	Short-term concerns, Long-term concerns
	1508	likelihood of survival, I would take the doctor's advice	Survival, Medical advice/experience	Long-term concerns, Advice/experience
	2012	recovery time at home, I would take the doctor's advice	Hospitalization & recovery, Medical advice/experience	Short-term concerns, Advice/experience
	1511	don't want anything done	No procedure wanted	Other
<i>Secondary Factors Influencing Preference</i>	0612	life or death	Survival	Long-term concerns
	1804	The need for further surgery with EVAR	Chronic Management	Long-term concerns
	1801	Ability to physically come through and length of time that the repair will last	Survival, Hospitalization & Recovery, Chronic Management	Short-term concerns, Long-term concerns
	0103	Best survival rate. Best for long term health	Survival, Chronic Management	Long-term concerns
	0803	Fear of unknown complications (due to past experiences)	Fear, Chronic Management, Medical History & Clinical Concerns, Multifaceted	Short-term concerns, Long-term concerns, Other
	2005	scared stiff! Can't tell what effect it will have in the long run!	Fear, Chronic Management, Lack of Information, Multifaceted	Short-term concerns, long-term concerns, other
	0723	I want to watch	Perioperative & Intraoperative Concerns	Short-term concerns
	0706	Don't want to be awake in operation	Perioperative & Intraoperative Concerns	Short-term concerns
	0726	All up to the doctor	Medical advice/experience	Advice/experience
	0503	My own past experiences regarding surgery. Other people's experience with surgery	Non-medical advice/experience	Advice/experience
1509	need more info	Lack of information	Other	
0703	Thought there is only one way of treatment for the AAA repair, which was the open repair	Lack of information	Other	
1702	Family & wife saying whether or not to do it or saying to get a second opinion. Age may be a factor. 'Why do it?'	Multifaceted, Medical History/Clinical Concerns, Non-medical Advice/Experience, Lack of Information	Long-term concerns, Advice/experience, Other	
0410	1) Open repair has less risk of follow up interventions post-operatively. 2) umbilical hernia will be repaired	Multifaceted, Medical History/Clinical Concerns, Chronic Management	Long-term concerns, Other	

Table 2 – What was the main factor influencing your preference?

Total Responses: 21	
Themes	Code Count
SHORT TERM (23)	
Post-op Complications	8
Hospitalization & Recovery	7
Intraoperative Concerns	8
LONG TERM (6)	
Survival	3
Chronic Management	3
ADVICE or EXPERIENCE (5)	
Non-medical Advice/Experience	3
Medical Advice/Experience	2
OTHER (8)	
Multifaceted	7
No Procedure Wanted	1
Total:	42

Categories (bold) and themes derived from patient responses regarding the main factor influencing preference. The total number of codes in each theme is tallied on the right, and the total number of codes in each category is shown in parentheses.

Results

Respondents & theme generation

Twenty one patients (9%) provided open-ended responses about the main factor influencing their preference, and forty seven (20%) provided responses regarding other aspects of care that influenced their decision (i.e. secondary factors). These answers were variably filled in by the patient themselves or transcribed verbatim by a research assistant depending on the study site. Thematic analysis led to the development of closely overlapping themes between both primary and secondary factors. Nine themes were developed regarding the primary factor in patient preference: Post-op complications, hospitalization & recovery, intraoperative concerns, survival, chronic management, non-medical advice/experience, medical advice/experience, multifaceted, and no procedure wanted. Ten themes were developed regarding secondary factors in patient preference: hospitalization & recovery, perioperative & intraoperative concerns, fear, survival, chronic management, medical history & clinical concerns, non-medical advice/experience, medical advice/experience, lack of information and multifaceted.

Categorization of responses

Veteran's responses to open-ended questions about primary and secondary concerns influencing preference for AAA repair type followed many similar trends. These responses were distilled into four overarching categories common to both questions: Short-term concerns, long-term concerns, advice or experience, and other (Table 2 and 3).

Qualitative observation of response data

Responses were typically short, ranging from single words to two sentences. Seven responses regarding primary factors and six responses regarding secondary factors listed multiple concerns. These responses were assigned an additional code of "multifaceted" and constitute much of the other category. The individual parts of multifaceted responses were also assigned codes and tallied for semi-quantitative analysis.

There was a much higher number of responses in the space for secondary concerns (21 versus 47), but seventeen of these were versions of "No", "N/A" or "None". These responses (or these parts of responses) were not counted in the semi-quantitative part of thematic analysis as they were deemed an artifact of phrasing in the questionnaire. Following this adjustment, the total number of responses to each question was nearly the same (21 and 22 for primary and secondary factors, respectively).

Responses were widely distributed between study centers, and only 4 patients responded to both questions. The mean age of respondents was 72 and the mean age of all patients enrolled in the PROVE-AAA was 73.

Main factor influencing patient preference

Nine themes were identified for the main factor influencing patient preference for type of aneurysm repair (Table 2). Example quotations from each category can be found in Table 1. Patients most frequently described short-term concerns (23 codes) as their primary factor, with themes including post-op complications, hospitalization & recovery, and intraoperative concerns. Only five responses indicated advice or experience as a primary factor.

Interestingly seven of the twenty one patient responses listed more than one, and often multiple concerns. These concerns spanned across both themes and categories. Some pa-

Table 3 – Do you have any other aspects of care that influence your preference?

Total Responses: 22*	
Themes	Code Count
SHORT TERM (13)	
Hospitalization & Recovery	7
Perioperative & Intraoperative Concerns	4
Fear	2
LONG TERM (20)	
Survival	4
Chronic Management	8
Medical History & Clinical Concerns	8
ADVICE or EXPERIENCE (10)	
Non-medical Advice/Experience	5
Medical Advice/Experience	5
OTHER (16)	
Lack of Information	10
Multifaceted	6
Total:	59

Categories (bold) and themes derived from patient responses regarding secondary factors influencing preference. The total number of codes in each theme is tallied on the right, and the total number of codes in each category is shown in parentheses. *This is the total number of responses after removing all responses equivalent to “n/a”.

tients made a very extensive list. Each aspect of these responses was coded individually and tallied to quantify the overall prevalence of each theme and category. A code and theme of ‘multifaceted’ was applied to complex responses to facilitate quantification. This theme accounts for 7 of the 8 codes in the other category. The only other theme in the other category belongs to the response of an 89-year-old disabled patient who stated: “don’t want anything done” –Pt. 1511, Theme: *No Procedure Wanted*

Secondary factors influencing patient preference

Other than the 17 responses equivalent to “none”, 10 themes were identified as secondary factors influencing patient preference (Table 3). Example quotations from each category can be found in Table 1. Of interest, more variation in responses were noted in this section, but overall the themes derived from these responses bore remarkable similarity to those identified from patients’ main concerns. When describing secondary factors, responses categorized as long-term concerns were most prevalent (20 codes), which included the themes survival, chronic management, and medical history & clinical concerns. Some patients listed multiple long-term concerns, referred to pre-existing medical conditions, or made statements that also incorporated other themes.

As compared to primary motivating factors, there were fewer responses categorized as short-term concerns (13 versus 23). The themes hospitalization & recovery, and perioperative & intraoperative concerns were nearly identical to those generated from primary motivating factors. However, an entirely new theme – fear, was identified among patient responses to this question. Fear was categorized as a short-term concern.

Many more patient responses categorized as Advice or Experience (10) were listed as a secondary factor than a primary factor (5). This included an equal split of both medical and non-medical advice.

One of the most prevalent themes encountered was an overall lack of information (10), which included statements regarding misinformation and a desire for more information. This was placed in the other category, as it did not occur in responses to the primary factor question. One notable example can be seen from a 64-year-old patient who wrote:

“Thought there is only one way of treatment for the AAA repair, which was the open repair” –Pt OX-03, Theme: Lack of information

Despite being almost 10 years younger than the mean study age, this patient ended up expressing a preference for EVAR after going through his enrollment.

Six patient responses listed multifaceted secondary factors. Some of these were quite complicated, encompassing multiple themes and categories.

Comparison of factors influencing patient preference for EVAR versus OSR

The significant overlap in themes that existed between both primary and secondary factors facilitated comparison between the two. Figure 2 illustrates the relative number of codes in each category for both primary and secondary factors. Patients were more likely to list short-term concerns as primary factors, and long-term concerns as secondary factors. We can also see that advice or experience (which includes physician recommendation) was more likely to be listed as a secondary factor. The other category primarily consists of multifaceted responses or lack of information (see Tables 2 & 3). Responses equivalent to

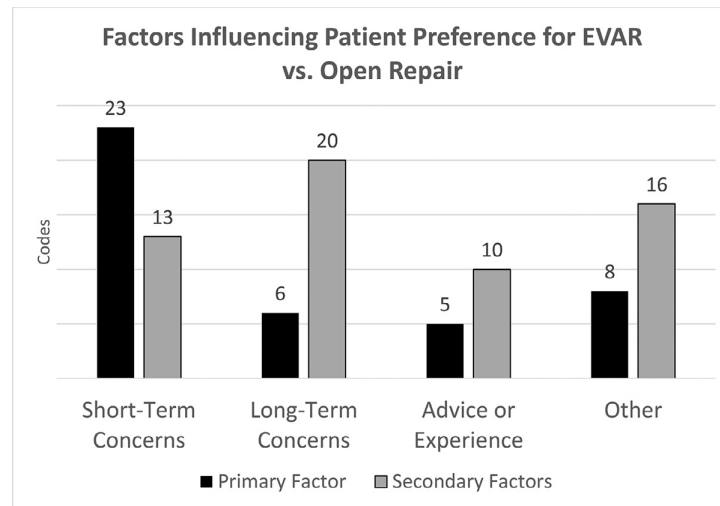


Fig. 2 – Factors Influencing Patient Preference for EVAR versus. Open Repair. Bars depict the number of individual codes that fell into each category.

“none” were not included. The nature of this qualitative analysis precludes strict statistical hypothesis testing, but the strong numerical trends help reinforce observations regarding the relative frequency of patient concerns in each category.

Patient age subgroup analysis

The mean age of patients enrolled in the PROVE-AAA trial is 73. The average age of patients preferring OSR ($n = 52$) and EVAR ($n = 162$) was 72.3 and 73 respectively (difference of 0.7 years, $P = 0.23$), which showed a slight, non-significant decrease in average age of patients who preferred OSR. For both primary & secondary factors, patients favoring long-term concerns tend to be younger. For the primary factor, it is a generous difference of 11 years, (76 years versus. 65 years, $P = 0.056$, Fig. 3).

From a qualitative perspective it is interesting to note that the youngest patient in the entire study (a 52-year-old) very clearly expressed a long term concern; “length of time repair lasts” as their primary factor. This patient also indicated a preference for OSR. In contrast, the disabled 89-year-old patient (one of four oldest patients in the study) simply said “don’t want anything done”.

Discussion

This qualitative analysis suggests that for patients facing a choice between open or endovascular AAA repair, short-term concerns relating to the procedure and recovery are more often the primary factor influencing patient preference, while long term concerns play a more secondary role. EVAR is associated with better short-term outcomes and has largely replaced OSR for anatomically appropriate patients.¹⁵ However,

in the long-term, EVAR is also associated with higher all-cause mortality, rupture, reintervention and secondary rupture rates versus OSR.¹⁶ Previous studies have indicated a relative patient preference for EVAR.^{17,18} Given that many of the advantages of EVAR involve the short-term benefits (i.e. faster hospital discharge, shorter recovery period, fewer initial complications), the relative prevalence of short-term concerns found in this qualitative study supports the notion that a focus on ‘short-term’ issues may be a driver in the preference for EVAR seen in the literature. 70% of respondents in the PROVE-AAA expressed a preference for EVAR (versus. 22% for OSR), which aligns with the relative abundance of Short-Term concerns observed in open responses about the primary factor influencing patient preference.

Considering each patient’s individual goals remains critical to effective shared decision-making. The literature on shared decision-making in breast cancer patients is robust and provides a useful reference point for discussion. This decision between radical mastectomy and lumpectomy bears some resemblance to the treatment of AAA, where an OSR definitively repairs the AAA while EVAR requires lifelong surveillance and potentially additional procedures. In breast cancer patients, the alignment between patient preference and surgery received is the most important factor in determining patient satisfaction.¹⁹ Moreover, among patients who were clinically eligible for either mastectomy or lumpectomy, studies found that increasing patient involvement in shared decision making leads to increased preference for more radical mastectomies.^{19–21} This contradicts longstanding assumptions in the oncologic surgery community that educated and empowered patients would prefer breast-conserving lumpectomies.¹⁹ These patients tend to favor more invasive surgery due to lower risks of recurrence, perceiving that long term health outweighs the drawbacks of more significant resection.²¹ In breast cancer, the majority of patients preferred the

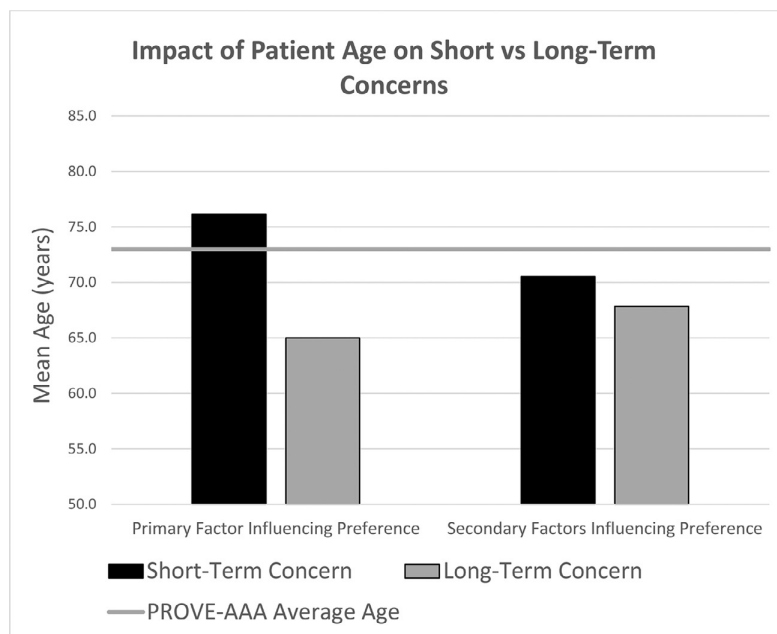


Fig. 3 – Impact of Patient Age on Short versus Long-Term Concerns. Bars represent the mean age of the subset of patients whose comments were wholly categorized as either short or long term concerns. On average, patients wholly favoring long-term concerns as their primary factor ($n = 4$) were 11 years younger than those wholly favoring short term concerns ($n = 7$) (76 years versus. 65 years, $P = 0.056$, 2-tailed t-test). A similar but less pronounced trend was observed for secondary factors. The mean age of enrolled patients is 73 (horizontal bar).

most permanent solution even at the cost of increased invasiveness and significant disfigurement.

This might suggest a contrast to the apparent preference for EVAR in AAA patients, but also may be due to intrinsic differences in each medical condition. Importantly, many breast cancer patients not only elected mastectomy, but refused cosmetic reconstructive surgery, citing age and worry for multiple operations as reasons.²⁰ This suggests that for some patients the loss of a breast is a relatively unimportant cosmetic issue, and the election for mastectomy without reconstruction reflects a desire for a simple, straightforward solution that removes all the tissue at risk for malignancy. The apparent preference for EVAR instead may reflect a similar interest in relative safety and rapid hospital discharge so that patients can resume their lives. These findings highlight the fact that surgeons cannot assume what is important to each patient, and when faced with a choice involving life-long repercussions, shared decision making is critical to achieving the most preferable outcome.

The qualitative nature of this study allows for more nuanced analysis of specific cases to elucidate trends and potential exceptions. The age subgroup analysis supports the notion that younger patients may be interested in the relative durability afforded by OSR. Patients who were selectively concerned with repair durability and other Long-Term concerns tended to be younger. This aligns with the work of Winterborn et. al. who found that overall 84% of respondents preferred EVAR, but the average age among patients favoring OSR was significantly younger.¹⁸

However, there was no significant difference in average age between patients who preferred OSR and those who preferred EVAR in this trial. While age may be a factor, it clearly is not the only factor.

Concomitant procedures are associated with increased perioperative morbidity and mortality²², but they may be an important factor for patients as well. For comparatively young patients interested in completing concomitant procedures, OSR clearly has specific benefits which influence preference.

Another important takeaway comes from the 89-year-old patient who expressed that he had no desire for treatment. Invasive or even minimally-invasive treatment may be an insurmountable obstacle for frail patients, reinforcing the critical need for appropriate patient counseling and shared-decision making regarding not just treatment modality but the decision to treat.

Limitations

The PROVE-AAA questionnaire was not designed as a qualitative research tool – instead, this analysis was done post-hoc to glean qualitative meaning from open-ended responses. The questionnaire provided a multiple-choice list of options regarding primary factors affecting preference immediately followed by an open response field. Thus the low response rate is likely attributable to many patients feeling they could answer satisfactorily with the space provided. Answers codified by the multiple-choice section will be addressed quantitatively as part of the endpoints of the PROVE-AAA, but they were not factored into this analysis as it was focused on patients

personalized responses. A more thorough qualitative analysis of factors influencing patient preference for AAA repair type could be conducted prospectively via utilization of an interview format, but the present analysis provides an important first step in establishing trends and common themes.

Implications

From this work, we have important implications. Previous qualitative investigations have established that patients have a strong desire for thorough information on options during the informed consent process for AAA repair,²³ and to contribute to shared decision making in vascular surgery.²⁴ We now have a more nuanced understanding of what drives patient preference for AAA repair, and appreciate that this decision process is multifaceted. For instance, patients were instructed to pick only one response in the multiple-choice question regarding the main factor influencing their preference, but 7 out of 21 patients used the blank field afterwards to list multiple concerns. This likely reflects indecision on the previous question. Many others used the field to provide a response that clarified, added to, or overlapped with their multiple-choice selection. Six patients also listed multifaceted secondary concerns. In addition to multifaceted concerns, one of the more common themes encountered was Lack of Information (10 codes), which included statements expressing lack of understanding, misinformation, and a desire to know more. When taken in concert, all these responses represent the complexity and multifaceted nature of patient preference when approaching AAA repair, reinforcing the importance of shared decision making.

Conclusion

In conclusion, this qualitative analysis provides new and complementary findings regarding patient preference for AAA repair type in the PROVE-AAA trial. When describing their preference, patients are more likely to list a short-term concern such as hospitalization time as a primary factor. Generally, EVAR is associated with improved short-term outcomes¹⁵, and previous studies have found patients tend to prefer EVAR.^{17,18} This analysis adds a specific study of the subjective factors influencing patient preference to the qualitative literature on AAA repair. Most often, we found that patients emphasize short-term concerns such as hospitalization and recovery time, but a select subset of patients prefer open surgery and often have strong reasons for doing so. Age may play an important role, with younger patients being more likely to list long-term concerns as the primary factor in their preference. This underscores the importance of patient education and shared decision making in the realm of AAA repair, and vascular surgeons should consider this when working with patients in order to reach an optimal outcome.

Author Contributions

All authors have substantial contributions to the conception or design of the work. Specifically, MJM, YDH, CJS, MAE were responsible for the acquisition, analysis, and interpretation of data for the work. JAB, MAE and PPG contributed to the design

and collection of data. MJM, MAE, PPG, YDH, and JLG drafted the work and revised it critically for important intellectual content including final approval of the version to be published. MJB, ELS, PRN, LM, GT, ET, OA, VJH, DHS, BSB, KM, PH, SS and JO all contributed to the collection of the data and revised the manuscript for important intellectual content including final approval of the version published. All authors are in agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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Disclosures

The authors report no proprietary or commercial interest in any product mentioned or concept discussed in this article.

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