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Original Article

Establishing the normal ranges of female and male anal canal and rectal wall vascularity with color Doppler anorectal ultrasonography

Sthela M. Murad-Regadas^{a,b,c,*}, Francisco Sergio Pinheiro Regadas^a,
Iris Daiana Dealcanfreitas^a, Francisco Sergio Pinheiro Regadas Filho^{a,c},
Graziela Olivia da S. Fernandes^a, Matheus Couto Furtado Albuquerque^a,
Carolina Murad Regadas^c, Marina Murad Regadas^c

^a Universidade Federal do Ceará (UFC), Faculdade de Medicina, Departamento de Cirurgia, Fortaleza, CE, Brazil

^b Universidade Federal do Ceará (UFC), Hospital das Clínicas, Unidade de Fisiologia Anorretal e Assoalho Pélvico, Fortaleza, CE, Brazil

^c Hospital São Carlos, Departamento de Cirurgia Colorretal, Unidade de Fisiologia Anorretal e Assoalho Pélvico, Fortaleza, CE, Brazil

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ABSTRACT

Study objectives: To evaluate blood supply in the anal canal, rectal wall and mesorectal fat of men and women, using color Doppler endorectal sonography to establish normal ranges for vascular parameters.

Methods: A prospective cross-sectional study conducted at a tertiary-care hospital recruited asymptomatic volunteers (≤ 50 years). Vascularity percentage and index were calculated for defined regions.

Results: Vascularity percentage and index were significantly higher in the puborectalis, mid-level external and upper internal anal sphincter compared to the low anal canal; these parameters were higher in men than in women at upper and middle levels of the inner anal canal structures. At mid-level, vascularity was greater in the external compared to the internal anal sphincter in both sexes; however, at the upper level it was greater in the puborectalis compared to the internal anal sphincter in women. Vascularity was greater in the rectal wall compared to the mesorectal fat, with no difference between middle and lower levels.

* Corresponding author.

E-mail: smregadas@hospitalsaocarlos.com.br (S.M. Murad-Regadas).

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Conclusions: Blood supply is highest at upper levels of the anal canal; however, inner structures are better irrigated in men. Moreover, the rectal wall is better irrigated than the mesorectal fat. Establishing normal ranges may permit future comparisons of the studied structures in disease states as well as the hormonal and age related changes.

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Estabelecendo padrões normais da vascularização do canal anal e da parede retal em indivíduos do sexo masculino e feminino com ultrassom anorretal com Doppler colorido

R E S U M O

Palavras-chave:

Vascularização do canal anal
Vascularização do reto
Doppler colorido
Ultrassom endoanal
Ultrassom endorretal

Objetivo: Avaliar vascularização do canal anal, parede retal e gordura mesorretal em homens e mulheres, usando ultrassonografia endorretal com Doppler colorido para estabelecer parâmetros vasculares de normalidade.

Métodos: Estudo prospectivo transversal incluindo voluntários assintomáticos com até 50 anos. Medidos os valores da porcentagem e do índice de vascularização foram calculados para regiões escolhidas.

Resultados: Valores da porcentagem e do índice foram significativamente maiores no puborretal, esfíncter externo (canal anal médio) e o esfíncter interno (canal anal superior) comparado ao canal anal inferior; esses parâmetros foram maiores em homens que em mulheres no canal anal médio e alto. No médio, a vascularização foi maior no esfíncter externo comparado ao interno em ambos os sexos; contudo, no canal anal superior, foi maior no puborretal comparado ao esfíncter anal interno em mulheres. A vascularização foi maior na parede retal comparada à gordura mesorretal, sem diferenças entre os níveis.

Conclusões: O suprimento sanguíneo é maior nos níveis altos do canal anal. As estruturas internas são mais irrigadas nos homens. A parede retal é mais irrigada que a gordura mesorretal. Os parâmetros vasculares estabelecidos permitirá futuras comparações das estruturas estudadas nos casos de doenças, assim como, alterações que ocorrem com a idade e mudanças hormonais.

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Introduction

Ultrasonography enables visualization of the anatomical and functional aspects of the anal canal and rectum and is a well-established tool for evaluating benign, malignant, and functional disorders. Numerous studies have shown good correlation between ultrasound imaging and surgical findings.¹⁻⁸ Ultrasound can also be used to assess vascularity, and several studies have evaluated the efficacy of intrarectal ultrasound with color Doppler and Doppler flow analysis in detecting possible differences in blood flow patterns between malignant⁹⁻¹¹ and benign¹²⁻¹⁴ anal canal and rectal diseases. Although color Doppler ultrasound has been used to evaluate tissue changes, to our knowledge no data are available concerning normal vascularization in the anal canal and rectal wall.

It is known that the anal canal and rectal wall differ from each other in anatomic structures and in blood vessel supply and distribution. The purpose of this study was to use 360° color Doppler endorectal ultrasonography to determine normal ranges for vascular parameters at different levels of the female and male anal canal, rectal wall, and mesorectal fat

in order to provide reference values that can facilitate future comparisons of anal canal structures in disease states.

Subjects and methods

Subjects

Consecutive asymptomatic volunteers (aged ≤ 50 years) were recruited among employees at two academic hospitals in Fortaleza (Clinical Hospital of the Federal University of Ceará and São Carlos Hospital). The clinical protocol was approved by the Research Ethics Committee of the Walter Cantídio University Hospital, and all subjects gave written informed consent.

Prospective subjects were evaluated clinically and underwent a physical examination which included digital examination and assessment for pelvic organ prolapse according to the Pelvic Organ Prolapse Quantification system (POP-Q) in women.¹¹ Men and nulliparous women were included if they had no anal canal, rectal, or urinary disorders. Women were included if their POP-Q status was stage 0. Subjects with fecal incontinence, constipation, urinary symptoms,

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