

Comparative study between amputation of the rectum in the classic Lloyd-Davies position and in ventral decubitus.

Estudo comparativo entre a amputação de reto na posição clássica de Lloyd-Davies e em decúbito ventral.

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ABSTRACT

Objective: to evaluate the benefits and disadvantages of the ventral decubitus position compared with that of Lloyd-Davies in patients submitted to abdominoperineal amputation of the rectum. **Methods:** we conducted a retrospective study of 56 patients submitted to abdominoperineal amputation of the rectum due to distal rectal and anal canal neoplasms, treated at the Central Hospital of the Santa Casa de Misericórdia in São Paulo between 2008 and 2017. **Results:** patients' mean age was 63.08 years, 48.2% of them women and 51.8%, men. Adenocarcinoma was the histological type, in 94.6% of cases, and squamous cell carcinoma, in 5.4%. The position of Lloyd-Davies was adopted in 66.1% of the procedures, and the ventral position, in 33.9%. At the time of surgery, four patients had synchronous metastases: hepatic (one case), pulmonary (one case) and simultaneous liver and lung (two cases). Neoadjuvant treatment was performed in 85.7% of the patients. Late postoperative complications occurred in 13 patients operated in the classic position and in one patient operated on in the ventral decubitus position. The overall survival time for the group operated in the classic position was on average 45.7 months, while in the group operated on in the ventral decubitus position it was 15.5 months. **Conclusion:** the ventral position group presented less need for intraoperative intravenous volume infusion

and fewer postoperative complications, whereas the Lloyd-Davies group had better surgical and anesthetic times. Relapse, disease-free time, and overall survival should be evaluated at a longer follow-up time.

Keywords: Intestinal Neoplasms. Amputation. Rectal Neoplasms. Colorectal Surgery

INTRODUCTION

Colon and rectum cancer is the third most common type of cancer in Brazil in men (5%) and the second in women (6.4%)¹. The most common histopathological type is adenocarcinoma, in 96% of the cases. Other histological types are rare malignant neoplasms, some requiring specific therapeutic conducts^{2,3}.

The singular anatomy of the rectum, its retroperitoneal location and the proximity of urogenital organs, autonomic nerves and anal sphincters, makes surgical access relatively complex. In addition, the dissection must be precise in the anatomic planes, since the medial dissection for the endopelvic fascia that lines the mesorectum can compromise the patient with local recurrence, whereas the lateral dissection to the avascular anatomical space presents with risk of mixed autonomic nerves lesion, with impotence in men and bladder dysfunction in both genders⁴.

Abdominoperineal amputation (APA) of the rectum is advocated for tumors of the lower third of the rectum, anal canal, tumors with pelvic invasion, metastatic tumors, and those associated with inflammatory bowel diseases⁵. Among the APA techniques, Miles surgery involves a definite colostomy, closure of the sigmoid above the tumor, ligation of the inferior mesenteric vessels, closure of the anus, and removal of the specimen through the perineum, encompassing the anus. It is a large surgery, with important intraoperative complications (bleeding and hypovolemic shock) and postoperative ones (perineal abscess, urinary tract infection, sexual impotence and neurogenic bladder). The surgical mortality of APA is between 0% and 6.5%⁵⁻⁷. The perineal time of the APA can be performed with the patient in the Lloyd-Davies position or in the ventral position.

When in Lloyd-Davies's position, Miles's surgery is done in one time with two concomitant surgical teams: one in the abdomen and one in the perineum, so that the patient remains in the supine position with 90° flexion of the thighs over the abdomen and also 90° flexion of the legs on the thighs, abducted in leg supports. Such positioning promotes shorter surgical time, with a consequent faster postoperative recovery, and avoids the risks associated with the ventral position related to the reduction of cardiac output and compression of body structures^{8,9}.

Recent studies suggest that the ventral position for excision of the rectum presents advantages such as better rectal dissection, less bleeding and less occurrence of iatrogenic perforations. On the other hand, surgical time increases due to the need to change the position of the patient and the non-synchronization of abdominal time with excision of the rectum. Nonetheless, it has benefits in terms of relapse and better cancer outcomes¹⁰.

In view of these facts, we intended to evaluate the benefits and disadvantages of the ventral decubitus position compared with that of Lloyd-Davies for the perineal time of APA in patients operated at the Central Hospital of the Santa Casa de Misericórdia in São Paulo.

METHODS

We conducted a retrospective study of patients submitted to APA for distal rectal adenocarcinoma or squamous cell carcinoma of the anal canal, treated at the Central Hospital of Santa Casa de Misericórdia, São Paulo, between 2008 and 2018. This is a comparative analysis between the surgical tactics for the perineal time of rectal APA: Lloyd-Davies positioning versus ventral decubitus.

Exclusion criteria were impossibility to obtain all the necessary data for analysis, surgery for amputation of rectum due to benign diseases, and patients who submitted only to a perineal time complementary to previous rectosigmoidectomy due to pelvic recurrence.

We analyzed the variables age, gender, comorbidities, neoadjuvance, pathological staging, diagnosis, surgical time, need for crystalloids or transfusion of blood and intraoperative blood products, hospitalization time, circumferential and proximal anatomopathological margin, dissected lymph nodes, surgical staging, perioperative complications (shock, bleeding, injury of other organs, deep venous thrombosis, acute urinary retention), early postoperative (infection and surgical wound dehiscence, pelvic collection, intestinal subocclusion, colostomy ischemia) and late complications (paracolostomic hernia, urinary incontinence and sexual impotence), disease-free time, and overall survival.

We performed statistical analysis with the software Statistical Package for Social Sciences (SPSS), v.13.0. In the descriptive analysis, we calculated the absolute and relative frequencies (n, percentage) for the qualitative variables and the summary measures (mean, median, standard deviation, minimum and maximum) for the quantitative

variables. We used the Chi-square or Fisher's exact test, and t-Student or Mann-Whitney test. We adopted a significance level of 5%.

This work was approved by the Institutional Ethics Committee with the following reference number: 1,252,153.

RESULTS

The sample consisted of 56 patients, who underwent rectal APA in Lloyd-Davis or ventral positions, the latter being used only from November 2012 on. The perineal time was performed in the classic Lloyd-Davies position in 37 patients (66.1%), and in the ventral position, in 19 (33.9%).

The epidemiological analysis of the sample showed 27 (48.2%) female patients and 29 (51.8%) male. The mean age was 63.08 years, with a median of 62 years, ranging from 37 to 87, with a standard deviation of 12.07. In the analysis of comorbidities, 17 (30.4%) patients had systemic arterial hypertension, five (8.9%) had diabetes mellitus, four (7.1%) were smokers, one (1.8%) were former smokers and five (8.9%) had other comorbidities.

The histological type was adenocarcinoma in 53 (94.6%) patients and squamous cell carcinoma in three (5.4%). At the time of surgery, one (1.8%) patient had synchronous hepatic metastasis, one (1.8%) pulmonary, and two (3.6%), simultaneous hepatic and pulmonary metastases. Neoadjuvance was performed in 48 (85.7%) patients, mostly radiotherapy and chemotherapy (46 patients) according to the Service protocol.

In the comparison between anesthesia times and surgical time, we observed a mean of 6.3 hours for the Lloyd-Davies group. For the ventral group, we found a mean anesthetic time of 7.7 hours, the comparison between the two groups being statistically significant ($p < 0.001$). Regarding surgical time, the Lloyd-Davies group presented a mean of 5.28 hours, and the ventral group, of 6.4 hours, also with statistical significance ($p = 0.006$).

The variation in the pre and postoperative hemoglobin levels of patients who did not receive blood transfusion in the Lloyd-Davies group showed an average of 2.24g/dl. In the ventral group, the mean variation was 2.62g/dl, without statistical significance between the two groups ($p = 0.442$). The variation of the pre and postoperative hematocrit of patients who did not receive blood transfusion in the Lloyd-Davies group had an average of 6.81%. A negative value of the hematocrit difference was found only in one patient, probably due to laboratory error. In the ventral group, the mean variation was 7.54%, not being statistically significant between the two groups ($p = 0.602$).

As for intraoperative blood transfusion, 14 patients from the Lloyd-Davies group received an average of 1.8 red cell units, with a median of 2,0. In the ventral group, three patients received transfusion, with an average of 3.6 units. The difference between the two groups was not statistically significant ($p=0.682$). By analyzing the amount of intraoperative volume received (crystalloids and colloids), we observed that the Lloyd-Davies group received an average of 4,432ml. The analysis was statistically significant ($p=0.021$).

We observed intraoperative complications in 13 (23.2%) patients, 11 (29.7%) of the Lloyd-Davies group and two (10.5%) of the ventral group, and the difference between them was not statistically significant ($p=0.181$, Fisher's test). Among these complications, we observed rectum perforation during dissection in one (2.7%) patient in the Lloyd-Davies position and in one (5.3%) patient in the ventral position, not statistically significant ($p=1.0$, Fisher's test). We observed a urethral lesion in only one (2.7%) patient of the Lloyd-Davies group and in none of the other group. Intraoperative bleeding was reported for 11 patients, ten (27%) of the Lloyd-Davies group and one (5.3%) of the ventral group ($p=0.77$, Fisher's Test).

Of the complications occurring during hospital stay, we found deep vein thrombosis in one (2.7%) patient and acute urinary retention in another (2.7%), both from the Lloyd-Davies group, and did not observe complications in the ventral group.

We recorded two deaths during hospitalization, one (2.7%) in the Lloyd-Davies group and one (5.3%) in the ventral group, the Fisher's test showing $p=1.0$. The cause of death were, respectively, hyperkalemia secondary to acute renal failure on the second postoperative day, and pulmonary sepsis on the 11th postoperative day.

As for duration of hospitalization, the Lloyd-Davies group had a mean of 6.16 days, and the ventral group, 6.37 days. Using the Mann-Whitney test, the respective mean positions were 26.51 and 32.37, not statistically significant ($p=0.193$).

We found in 15 (26.8%) early postoperative complications (up to 30 days after surgery), eight (21.6%) in the Lloyd-Davies group and seven (36.8%) in the ventral group, not statistically significant ($p=0.223$). Among the complications, we observed perineal surgical wound infection in ten patients, six (16.2%) in the Lloyd-Davies group and four (21.1%) in the ventral group, without statistical significance (Fisher's test, $p=0.72$). We found operative wound dehiscence in seven patients, three (8.1%) in the Lloyd-Davies group and four (21.1%) in the ventral group, with no statistical significance ($p=0.212$). We observed pelvic abscess in one (2.7%) patient of the Lloyd-Davies group only, with no statistical significance ($p=1.0$). We found sub-occlusion in only two (10.5%) patients of the ventral group only, without statistical significance (Fisher's test, $p=0.111$). Colostomy

ischemia occurred in one (2.7%) patient of the Lloyd-Davies group, with no statistical significance ($p=1.0$).

Late complications (occurring after 30 days of surgery) occurred in 14 patients (25%), 13 (35.1%) in the Lloyd-Davies group and only one (5.3%) in the ventral group, with statistical significance ($p=0.021$). Among the late complications, we observed urinary incontinence in five (13.5%) patients in the Lloyd-Davies group and none in the ventral group ($p=0.155$, Fisher's test). Sexual impotence occurred in one (2.7%) patient of the Lloyd-Davies group and in none of the ventral group ($p=1.0$). We observed paracolostomic hernia only in five (13.5%) patients of the Lloyd-Davies group ($p=0.155$, Fisher's test). We found subocclusion and acute obstructive abdomen in three patients, two (5.4%) of the Lloyd-Davies group and one (5.3%) of the ventral group ($p=1.0$).

Regarding resection margins, the proximal was negative in all cases. The circumferential margin was positive in five cases, two (5.4%) of the Lloyd-Davies group and three (15.8%) of the ventral group, but not statistically significant ($p=0.324$, Fisher's test).

We analyzed The number of resected lymph nodes with the Mann-Whitney test. The Lloyd-Davies group had a median of seven lymph nodes, ranging from zero to 25, and a mean of 8.51. In the ventral group, the median was 12 lymph nodes, with a range from zero to 23, and a mean of 11, without statistical significance ($p=0.193$).

As to relapse, six (10.7%) patients had local recurrence, and five (8.9%), systemic recurrence. Among the patients with local recurrence, five (13.5%) were of the Lloyd-Davies group, and one (5.3%), of the ventral group ($p=0.65$). We observed systemic recurrence in three (8.1%) patients of the Lloyd-Davies group and in two (10.5%) of the ventral group ($p=1.0$). For analysis of disease free time, we used a log-rank test, whose result was not statistically significant ($p=0.193$).

The overall survival time for the Lloyd-Davies group had a mean of 45.7 months, median of 46.1, ranging from one to 85.2 months, and a standard deviation of 22.9 months. For the ventral group, the mean was 15.5 months, median of 14.2, range of three to 33.4 months, and with standard deviation of 7.2.

DISCUSSION

The present study dealt with a sample with a predominance of rectal neoplasia cases in males, similar to the North American and global incidence, but unlike the Brazilian, which slightly favor women^{1,11-14}. The mean age at diagnosis of rectal neoplasia in our sample was compatible with those found in the literature, whose value is in the

range of 63 years for men and 65 for women^{14,15}. The predominant comorbidities of the sample were hypertension, diabetes *mellitus* and smoking. Several studies have linked diabetes with increased colorectal cancer, as well as smoking (especially for rectal cancer)¹⁶⁻²². The histological types observed are consistent with global statistics^{2,3}.

Regarding the technical aspects of the comparison between the two surgical positions of interest for the abdominoperineal amputation of the rectum, we observed a statistically significant difference of the average surgical and anesthetic times, the Lloyd-Davies position having significantly faster execution in both features. Our data were contrary to other studies in the international literature, in which the ventral position was faster^{23,24}.

As for intraoperative blood loss, analyzed by the difference in the hemoglobin and hematocrit levels in the pre and postoperative periods, we observed no statistically significant difference between the two positions. In the literature, the ventral position is associated with less blood loss than that of Lloyd-Davies²⁴. Blood transfusions occurred in 37.8% of patients in the Lloyd-Davies group and in 15.8% of patients in the ventral group, although there was no statistically significant difference, such data being similar to international studies²⁴. The difference in intraoperative intravenous volume received was statistically significant between the groups, the ventral group having received less.

Perioperative complications, early complications and death did not show statistically significant differences between the groups, in contrast to the better performance of the ventral position in this aspect in the literature²⁴. The analysis of late complications in general was statistically significant, with a greater predominance in the Lloyd-Davies group, in agreement with the researched literature²⁴. Regarding the duration of hospitalization, we found no statistical significance between the groups, but in the literature the ventral position displayed shorter hospital stay²⁴.

The circumferential margins of the specimens, as well as the variation in the number of lymph nodes removed from the two groups, were also not statistically significant, as well as local and systemic recurrence. In some studies, local recurrence had a lower incidence in the ventral group^{23,25}, and in others, this difference was not identified²⁷. The analysis of disease-free time showed no statistically significant difference between groups, a fact also observed in a Chinese study in 2015²⁴.

We conclude that the analysis of the factors related to the different positions for the abdominoperineal amputation of the rectum revealed that the ventral position group had less need for intraoperative intravenous volume infusion and lower incidence of late postoperative complications, while the Lloyd-Davies position group obtained better surgical

and anesthetic times. There were no statistically significant differences between the two groups in the bleeding and intraoperative blood transfusion rates, perioperative and early complications, deaths, duration of hospitalization, involvement of the circumferential margin and number of dissected lymph nodes. We shall perform the evaluation of relapse, disease-free time and overall survival after a longer follow-up.

Compared with the Lloyd-Davies position, the ventral position seems to be the best choice for patients undergoing abdominoperineal amputation of the rectum due to the lower rate of late complications. However, longer follow-up time is necessary to perform the choice of surgical position based on the oncologic outcome.

RESUMO

Objetivo: avaliar benefícios e desvantagens do posicionamento em decúbito ventral em relação ao de Lloyd-Davies, de pacientes submetidos à amputação abdominoperineal de reto. **Métodos:** estudo retrospectivo de 56 pacientes submetidos à amputação abdominoperineal de reto por neoplasias de reto distal e de canal anal, tratados no Hospital Central da Santa Casa de Misericórdia de São Paulo entre de 2008 e 2017. **Resultados:** a média de idade dos pacientes foi de 63,08 anos, sendo 48,2% deles mulheres e 51,8%, homens. Adenocarcinoma foi o tipo histológico em 94,6% dos casos e carcinoma espinocelular em 5,4%. A posição de Lloyd-Davies foi a adotada em 66,1% das cirurgias e a posição ventral em 33,9%. No momento da cirurgia quatro pacientes apresentavam metástases sincrônicas: hepática (um caso), pulmonar (um caso) e hepática e pulmonar simultâneas (dois casos). Tratamento neoadjuvante foi realizado em 85,7% dos pacientes. Complicações pós-operatórias tardias ocorreram em 13 pacientes operados na posição clássica e em um paciente operado em decúbito ventral. O tempo de sobrevida global para o grupo operado na posição clássica foi, em média, de 45,7 meses, enquanto que no grupo operado em decúbito ventral foi de 15,5 meses. **Conclusão:** o grupo da posição ventral apresentou menor necessidade de infusão de volume intravenoso intraoperatório e menos complicações pós-cirúrgicas tardias, enquanto que o grupo Lloyd-Davies obteve melhores tempos cirúrgicos e anestésicos. Recidiva, tempo livre de doença e sobrevida global devem ser avaliados em um tempo maior de seguimento.

Descritores: Neoplasias Intestinais. Amputação. Neoplasias Retais. Cirurgia Colorretal.

REFERENCES

1. Instituto Nacional de Câncer José Alencar Gomes da Silva. Coordenação de Prevenção e Vigilância Estimativa 2014: Incidência de Câncer no Brasil. Rio de Janeiro: INCA, 2014. Disponível em: <<http://www.inca.gov.br/estimativa/2014/index.asp?ID=7>>
2. Hamilton SR, Aaltonen LA. Pathology and Genetics of Tumours of the Digestive System. Lyon: IARC 2000. Disponível em: <<http://www.iarc.fr/en/publications/pdfs-online/pat-gen/bb2/BB2.pdf> >
3. Stewart SL, Wike JM, Kato I, Lewis DR, Michaud F. A population-based study of colorectal cancer histology in the United States, 1998-2001. *Cancer*. 2006;107(5 Suppl):1128-41.
4. Schmidt CE, Bestmann B, Küchler T, Longo WE, Kremer B. Ten-year historic cohort of quality of life and sexuality in patients with rectal cancer. *Dis Colon Rectum*. 2005;48(3):483-92.
5. Cruz GMG, Ferreira RMRS, Neves PM. Amputação abdominoperineal: uma cirurgia fora de moda? - Estudo retrospectivo de 135 cirurgias realizadas ao longo de quatro décadas. *Rev Bras Coloproct*. 2004;24(2):103-18.
6. Burgos FJ, Romero J, Fernández E, Perales L, Tallada M. Risk factor for developing voiding dysfunction after abdominoperineal resection for adenocarcinoma of the rectum. *Dis Colon Rectum*. 1988;31(9):682-7.
7. Bokey E, Chapuis PH, Hughes WJ, Joorey SG. Morbidity, mortality and survival following resection for carcinoma of the rectum of Concord Hospital. *Aust N Z J Surg*. 1990;60(4):253-9.
8. Lloyd-Davies OV. Lithotomy-Trendelenburg position for resection of rectum and lower pelvic colon. *Lancet*. 1939;234(6045):74-6.
9. Edgecombe H, Carter K, Yarrow S. Anaesthesia in the prone position. *Br J Anaesth*. 2008;100(2):165-83.
10. Tayyab M, Sharma A, Ragg JL, Macdonald AW, Gunn J, Hartley JE, et al. Evaluation of the impact of implementing the prone jackknife position for the perineal phase of abdominoperineal excision of the rectum. *Dis Colon Rectum*. 2012;55(3):316-21.
11. Jemal A, Siegel R, Xu J, Ward E. Cancer Statistics, 2010. *CA Cancer J Clin*. 2010;60(5):277-300. Erratum in: *CA Cancer J Clin*. 2011;61(2):133-4.
12. Ferlay J, Soerjomataram I, Ervik M, Dikshit R, Eser S, Mathers C, et al. GLOBOCAN 2012 v1.0, Cancer Incidence and Mortality Worldwide: IARC CancerBase No. 11 [Internet]. Lyon, France: International Agency for Research on Cancer; 2013. Disponível em:<<http://globocan.iarc.fr>>.

13. Murphy G, Devesa SS, Cross AJ, Inskip PD, McGlynn KA, Cook MB. Sex disparities in colorectal cancer incidence by anatomic subsite, race and age. *Int J Cancer*. 2010;128(7):1668-75.
14. American Cancer Society. *Colorectal Cancer Facts & Figures 2014-2016*. Atlanta: American Cancer Society; 2014. Disponible em: <<http://www.cancer.org/acs/groups/content/documents/document/acspc-042280.pdf> >
15. Howlader N, Noone AM, Krapcho M, Garshell J, Neyman N, Alekruse SF, editors, et al. *SEER Cancer Statistics Review, 1975-2010*. Bethesda, MD: National Cancer Institute; 2013.
16. Larsson SC, Orsini N, Wolk A. Diabetes mellitus and risk of colorectal cancer: a meta-analysis. *J Natl Cancer Inst*. 2005;97(22):1679-87.
17. Campbell PT, Deka A, Jacobs EJ, Newton CC, Hildebrand JS, McCullough ML, et al. Prospective study reveals associations between colorectal cancer and type 2 diabetes mellitus or insulin use in men. *Gastroenterology*. 2010;139(4):1138-46.
18. Secretan B, Straif K, Baan R, Grosse Y, El Guissassi F, Bouvard V, Benbrahim-Tallaa L, Guha N, Freeman C, Galichet L, Coglianò V; WHO International Agency for Research on Cancer Monograph Working Group. A review of human carcinogens - Part E: tobacco, areca nut, alcohol, coal smoke, and salted fish. *Lancet Oncol*. 2009;10(11):1033-4.
19. Liang PS, Chen TY, Giovannucci E. Cigarette smoking and colorectal cancer incidence and mortality: systematic review and meta-analysis. *Int J Cancer*. 2009;124(10):2406-15.
20. Paskett ED, Reeves KW, Rohan TE, Allison MA, Williams CD, Messina CR, et al. Association between cigarette smoking and colorectal cancer in the Women's Health Initiative. *J Natl Cancer Inst*. 2007;99(22):1729-35.
21. Giovannucci E. An updated review of the epidemiological evidence that cigarette smoking increases risk of colorectal cancer. *Cancer Epidemiol Biomarkers Prev*. 2001;10(7):725-31.
22. Limsui D, Vierkant RA, Tillmans LS, Wang AH, Weisenberger DJ, Laird PW, et al. Cigarette smoking and colorectal cancer risk by molecularly defined subtypes. *J Natl Cancer Inst*. 2010;102(14):1012-22.
23. Hu X, Cao L, Zhang J, Liang P, Liu G. Therapeutic results of abdominoperineal resection in the prone jackknife position for T3-4 low rectal cancers. *J Gastrointest Surg*. 2015;19(3):551-7.

24. Liu P, Bao H, Zhang X, Zhang J, Ma L, Wang Y, et al. Better operative outcomes achieved with the prone jackknife vs. lithotomy position during abdominoperineal resection in patients with low rectal cancer. *World J Surg Oncol.* 2015;13:39.

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