World J Surg (2007) 31:1658–1664
DOI 10.1007/s00268-007-9111-6

World Journal of Surgery

Subtotal Colectomy with Antiperistaltic Cecorectal Anastomosis in the Treatment of Slow-transit Constipation: Long-term Impact on Quality of Life

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Published online: 31 May 2007

Abstract
Background The aim of the study was to evaluate the effectiveness of subtotal colectomy with cecorectal anastomosis (SCCA) in the treatment of slow-transit constipation, not just in terms of symptom resolution but also the overall impact on patients' quality of life.
Methods Between 1991 and 2005, 43 patients underwent SCCA at our institution, 22 for slow-transit constipation (STC) and 21 for other types of colic diffuse disease (non-slow-transit constipation: NSTC), the latter being considered controls. A total of 29 patients (17 affected by STC) were administered a 50-item telephonic questionnaire, including the Gastrointestinal Quality of Life Index (GIQLI), the Wexner constipation and incontinence scale (WC, WI), and individual willingness to repeat the procedure. Questionnaire data and other parameters such as age, sex, length of follow-up, complications, and length of hospital stay were analyzed and compared, in order to evaluate possible correlations between the parameters and their related impact on quality of life, procedural effectiveness in terms of symptomatic regression, qualitative differences related to pathology (constipation versus non-constipation), and surgical approach (laparotomy versus video-laparo-assisted procedure).
Results There were no procedure-related deaths in this series (mortality: 0%); however, we found two complications in the STC group (9.1%), one requiring reoperation. The GIQLI mean score for the STC group was 115.5 ± 20.5 (mean score for healthy people 125.8 ± 13), and the WC mean score passed from a preoperative value of 20.3 to a postoperative value of 2.6. Regression analysis revealed a significant correlation between GIQLI and urgency and abdominal pain, and abdominal pain correlated significantly with pathology (STC). A high number of patients (88.2% in STC) expressed a willingness to repeat the procedure given the same preoperative conditions.
Conclusions Comparing our results to those of the most homogeneous literature data, SCCA does not appear to be inferior to subtotal colectomy with ileorectal anastomosis (IRA) in terms of therapeutic effectiveness, postoperative mortality and morbidity, or overall impact on quality of life.

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Constipation is one of the most common gastrointestinal symptoms. Whereas in a great number of cases constipation is mild and easy to treat by a behavioral or medical approach, a minority of patients are affected by severe and incapacitating symptoms that are not responsive to nutritional or pharmacological therapy. For these cases only, surgical treatment can be recommended.

Over the last several decades, surgical procedures for constipation have evolved and patient selection has become more rigorous. More invasive surgery (subtotal or partial colectomy) is reserved for patients affected by severe slow-transit constipation (colonic inertia), while in the more frequent cases of outlet-obstruction constipation a more conservative procedure is indicated.

Several studies [1–13] have demonstrated the effectiveness of surgical treatment for slow-transit constipation (STC), tested in terms of symptom resolution (bowel frequency), whereas few authors [12] have evaluated the long-term quality of life of STC patients.

Subtotal colectomy with ileorectal anastomosis (IRA) is still the most widely adopted procedure [6], owing to its supposedly superior effectiveness in bowel movement frequency.

Subtotal colectomy with cecorectal anastomosis (SCCA) represents a valid alternative to more widely adopted surgical approaches for the treatment of colonic inertia [8]. In particular, the preservation of the terminal ileum, cecum, and ileocecal valve theoretically represents a physiological advantage over IRA, avoiding malabsorption and colonic bacterial contamination of the small bowel; moreover, the cecal reservoir and its water-absorbing function would seem to provide an additional preventive factor regarding diarrhea, urgency, and incontinence, without affecting the efficacy of SCCA in alleviating constipation [8].

The aim of the present study was to evaluate the procedural effectiveness of SCCA, not just in terms of symptom resolution but in more general terms, including the overall impact on patients' quality of life.

Patients and methods

Between March 1991 and May 2005, 43 patients underwent SCCA at our institution. Twenty-two patients underwent surgery for STC, and 21 for other types of colic diffuse disease, such as carcinomas (9), polyposis (1), ulcerative colitis (3), Crohn's disease (3), extended diverticular disease (4), and radiation injuries (1). These latter 21 cases were considered a control group. Preoperative evaluation for patients affected by STC included a transit study with radio-opaque markers, a complete colonoscopy, a defecography, and anorectal manometry, with electromyography performed in just a few cases. An indication for surgical treatment was determined in the presence of very severe symptoms (colonic inertia), when every attempt at medical therapy (high fiber diet, laxatives, enemas), had failed, and in most cases after a psychiatric evaluation (the relationship between STC and psychopathological aspects has often been described [14]).

When a concomitant pelvic floor dysfunction was detected, patients were considered as primarily affected by outlet obstruction constipation and were directed toward less invasive approaches (such as biofeedback or transanal resections). The surgical procedure we performed was a subtotal colectomy with antiperistaltic cecorectal anastomosis [8, 15], carried out via laparotomy in 38 cases and a videolaparoscopic approach in the last 5 cases.

The intervention involves, after a complete mobilization of the colon, a resection 10–15 cm distal to the ileocecal junction and at the upper part of the rectal ampulla; the cecum is then lowered into the pelvis, without any rotation, and an antiperistaltic cecorectal anastomosis is performed between the cecal fundus (after appendectomy) and the rectum, after introduction of a stapler through the cecal resection line. In the laparoscopic approach we use 5 trocars (trocar 1 periumbilical, trocars 2–3–4–5 drawing a 15-cm side square around trocar 1), using a Pfannestiel incision to perform the anastomosis and to remove the resected colon (Fig. 1). Beginning with the last two laparoscopic interventions, have performed the anastomosis by introducing the stapler via the anus, with the intention of carrying out a ''cleaner,'' ''tensionless'' procedure.

Data regarding clinical outcomes were retrospectively obtained from clinical records. Patients were asked by telephone to answer a 50-item questionnaire, including the Gastrointestinal Quality of Life Index (GIQLI), the Wexner incontinence scale (WI), the Wexner constipation scale (WC) (asking the patients to recall preoperative constipation grade), and the patients' willingness to undergo the same procedure under the same preoperative clinical conditions. All questionnaires were submitted to the patients by a resident MD of our Institution, with the intent of rendering the questions and the modalities of replying to them more comprehensible to the interviewees than self-administration.

The GIQLI is a validated quality-of-life questionnaire [16] consisting of 36 questions designed to evaluate specific gastrointestinal symptoms and the impact of the disease on the physical, psychological, and social spheres

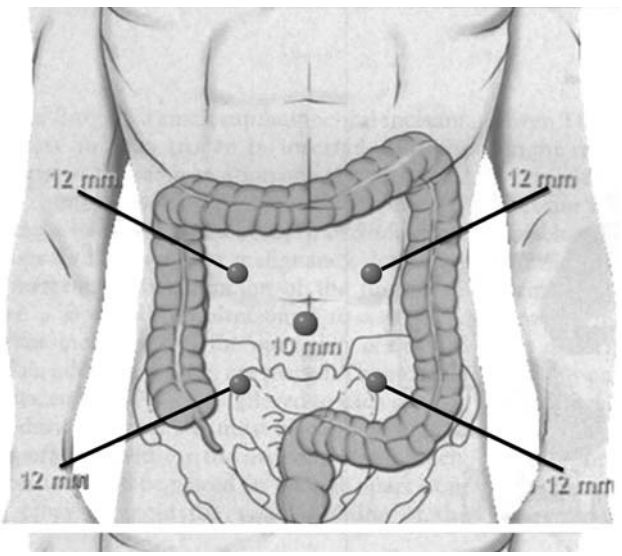

Fig. 1 Port size and placements in subtotal colectomy with cecorectal anastomosis (SCCA)

Table 1 Subgroup characteristics

		STC group		NSTC group	Total
		All	VL		
Gender	Male	1	0	7	8
	Female	16	5	5	21
Age	Mean (SD) (range)	48.6 (19.3) (23–92)	42.8 (11.4) (34–60)	67.3 (15.2) (38–84)	56.4 (19.8) (23–92)
Follow-up(months)	Mean (SD) (range)	72.4 (41.1) (10–147)	30.2 (18.2) (10–50)	111.1 (54,9) (22–172)	88.4 (50.2) (10–172)
Hospital stay[a]	Mean (SD) (range)	11.9 (4.2) (8–25)	12.6 (7.1) (8–25)	17.9 (12.6) (9–46)	15.2 (10.1) (8–46)
GIQLI (0–144)	Mean (range)	115.5 (79–142)	117.2 (79–138)	106.7 (63–138)	111.9 (63–142)
WI (0–20)	Mean (range)	3 (0–18)	3.8 (0–7)	2.2 (0–8)	2.6 (0–18)
Bowel movements per day	Mean (range)	2.8 (0–10)	3 (2–5)	2 (1–5)	2.5 (0–10)
Repeat inter	%	88.2	100	83.3	86.2

[a] Data referring to 43 patients

STC slow-transit constipation (including VL subgroup); *VL* slow-transit constipation treated videolaparoscopically; *NSTC* non-slow-transit constipation; *GIQLI* Gastrointestinal Quality of Life Index; *WI* Wexner Incontinence Scale; *Repeat inter* willingness to repeat the procedure

of the patients. We preferred this survey to others that were more oriented toward outlet quality (e.g., Patient Assessment Constipation Quality of Life survey (PAC-QoL)), because we believe that it provides a more complete view of the patient and it also evaluates upper gastrointestinal tract symptoms, the presence of upper gastrointestinal dismotility being well-documented in idiopathic STC [17]. Most of the questions concern the 2 weeks immediately preceding administration of the questionnaire; there are four possible answers to every question, scored from 0 points (worst) to 4 points (best). The final sum ranges from 0 to 144, 125.8 ± 13 being the mean score for healthy people obtained during validation studies [16].

WI [18] is a validated and internationally adopted questionnaire that has 5 items to quantify incontinence grade and frequency and its effect on ordinary life. Each question is answered on a scale of 0 to 4, the global score ranging from 0 (best) to 20 (worst).

WC [19] is also a validated and internationally adopted questionnaire that is used to quantify a patient's constipation grade. Questions examine constipation in its clinical expressions. The scale ranges from 0 (best) to 30 (worst).

Data regarding abdominal pain and urgency, measured on a frequency scale from 0 (never) to 4 (always), refer to questions 1 and 30 of GIQLI. Questionnaire data and other parameters such as age, sex, length of follow-up, presence or absence of complications, and length of hospital stay, were analyzed and compared, using parametrical tests and, when appropriate, non-parametrical tests (the Mann-Whitney test for two variable independents and the Wilcoxon rank sum test for two paired variables), in order to evaluate possible correlations between the parameters and their related impact on quality of life, procedural effectiveness in terms of symptomatic regression, qualitative differences related to pathology (constipation versus non-constipation) and surgical approach (laparotomy versus video-laparo-assisted procedure). Data analysis was performed using SPSS 12.0 software.

The results were evaluated in pathology groups—slow-transit constipation (STC) and non-slow transit constipation (NSTC)—to test the intervention independently of the basic disorder. Of the first group (STC), a subgroup of patients undergoing a video-laparo-assisted procedure (VL) was considered separately.

Data regarding clinical outcomes (hospital stay, complications) refer to all 43 patients submitted to SCCA (22 STC versus 21 NSTC), whereas the questionnaire results refer to the 29 patients (17 STC versus 12 NSTC) we succeeded in contacting by telephone (6 patients were lost to follow-up; 8 are deceased).

The study was approved by the Institutional Review Board, and informed consent was obtained from all participants.

Results

Clinical outcomes

Postoperative complications (9.3%) included one early anastomotic leak in a patient of the VL subgroup, which was treated and healed conservatively; one cecal dilatation with subocclusive episodes requiring reoperation of cecal resection and ileorectal anastomosis in a patient from the STC group; and two anastomotic leaks treated with ileostomy in patients affected by diverticular disease (NSTC).

Mean hospital stay in the STC group was shorter than in the NSTC group (11.9 days versus 16.4 days; $p = 0.76$; Table 1).

Eight patients are deceased (7 affected by carcinoma, 1 by diverticular disease, all in the NSTC group). Thus the 7 deaths are attributable to the progression of the disease and 1 to ischemic heart disease.

Subgroup characteristics

Data regarding subgroup characteristics are reported in Table 1. The STC and NSTC groups differ statistically in age (48.6 years versus 67.3 years ; $p < 0.01$, Student's *t*-test) and gender (F/M 16/1 versus 7/5; $p = 0{,}03$, Fisher's exact test). Follow-up mean times also differ between the groups, being shorter in the VL group (mean 30.2 months), owing to the recent introduction of the procedure.

Procedure effectiveness

Bowel movements per day (BM) and WC were considered to test procedure effectiveness in alleviating constipation. A mean 2.5 BM was reported by STC patients, with a range of 0 to 10. Group scores were similar (the higher data in the VL group could be attributed to the shorter follow-up time) (Table 1).

The Wexner constipation scale was applied, referring to preoperative and postoperative condition; preoperative data presented an obvious and significant difference between the STC and the NSTC groups (20.3 versus 6.9; $p < 0.001$, Mann-Whitney test; Figs. 2 and 3). Postoperative evaluation registered a mean value of 2.6 for the STC group (range: 0–9), with a significant score variation with respect to the preoperative value ($p < 0.001$ Wilcoxon test; Figs. 2 and 3); similar data were obtained for the VL subgroup and the NSTC group (3.4 and 2.3, respectively).

Quality of life

The GIQLI mean scores were higher in the STC group than in the NSTC group (115.5 versus 106.7, $p = 0.29$). Patients who underwent a video-laparo-assisted procedure demonstrated an even better result (117.2 ± 24.2; Table 1).

The WI questionnaire registered a similar mean score for all groups (Table 1); VL group patients presented a higher score (3.8), probably owing, once more, to the shorter follow-up time. Urgency and abdominal pain were measured on a frequency scale from 0 (never) to 4 (always). Patients in the STC group reported a significantly higher abdominal pain mean score than those in the NSTC group (1.02 versus 0.42 ($p = 0.04$; Mann Whitney test; Fig. 4). In contrast, we registered a higher urgency score for the NSTC group (1.58 versus 0.88 ($p = 0.2$; Mann Whitney test; Fig. 5)

The last parameter evaluated was the willingness to undergo the same procedure in the preoperative clinical conditions: 88.2% of STC patients and 100% of the VL subgroup (only 5 patients) would repeat the choice (Table 1).

Parameter correlations

Regression analysis (SPSS 12.0) of the data revealed a significant correlation between GIQLI and:

abdominal pain (R: –0.368, $p < 0.05$; Spearman Rho test; Fig. 6); urgency (R: –0.524, $p < 0.01$; Spearman Rho test; Fig. 7).

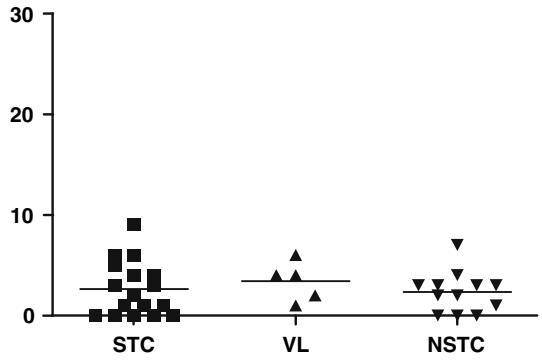

Fig. 3 Postoperative WC values among the subgroups

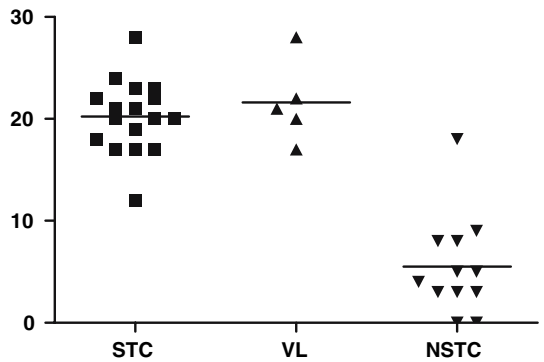

Fig. 2 Preoperative Wexner constipation scale (WC) values among the subgroups

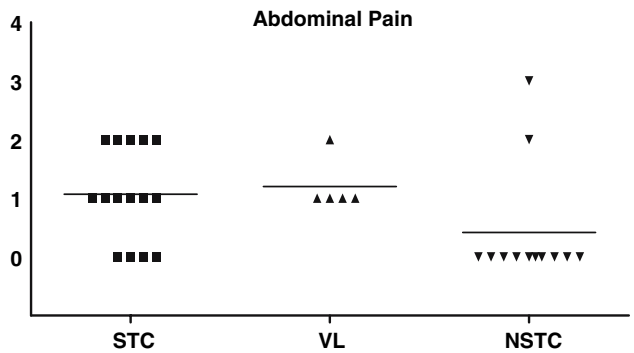

Fig. 4 Distribution of abdominal pain in the subgroups (on a scale from 0 (never) to 4 (always))

A strong correlation, although not statistically significant, exists between GIQLI and WI (R: –0.321; $p > 0.05$ Spearman Rho test). Abdominal pain correlates with pathology (STC; chi-square: 7.7; $p < 0.05$), preoperative WC (R: +0.454, $p < 0.05$; Spearman Rho test), and postoperative WC (R: +0.703, $p < 0.01$; Spearman Rho test).

Discussion

The surgical treatment of constipation has always been a matter for debate. Unlike surgery for other kinds of disorders, the main objective of the surgical treatment of constipation is the resolution of a symptom that is difficult to express or to quantify, and whose impact on quality of life has always been underestimated [20].

Moreover, the surgical procedures usually adopted, especially for STC, imply a definitely invasive approach and are burdened with potential, and not inconsiderable, complications while delivering irregular results. It is obvious that careful and precise patient selection is a basic presupposition for the success of this kind of surgery [6, 9]. For the same reason, it is difficult to establish reliable parameters to determine and quantify the success of the above procedures. The IRA procedure remains the most widely adopted surgical procedure for STC [6]. The reasons for this preference are based on its supposedly superior effectiveness compared to more conservative resections (partial resections, SCCA) [4–6, 11].

From a review of the outcome of colectomy in the treatment of STC [6], it appears that the parameters used for results analysis are, in most cases, different from one series to another, not standardized, incomplete, and often based on subjective data. Hence these parameters are insufficient to quantify the impact of the procedure on the patients' quality of life.

Recently, FitzHarris [12] proposed a quantitative and qualitative evaluation model in a series of 75 patients undergoing subtotal colectomy for STC, which is a useful comparison reference for results analysis in our series. No procedure-related deaths were reported among 22 patients submitted to SCCA for STC, (mortality: 0%), and the postoperative complication rate (2 out of 22: 9%) was lower than, or at least comparable to, that reported in other series [6, 12].

In particular, only the second of the two cases mentioned above (an anastomotic leakage and an anastomotic stenosis with cecal dilatation) required surgical revision. Procedural effectiveness, measured by constipation symptom resolution, was documented by comparing preoperative and postoperative WC data; in the STC group the mean value passed from 20.3 to 2.6 (a statistically significant decrease ($p < 0.001$ Wilcoxon test; Figs. 2 and 3).

Only one patient (5.8%) (postoperative WC: 9) reported continued occasional laxative use (20% in the FitzHarris series, 6% in the Pikarsky series) [10, 12]. The frequency of BM (2.81, range 0–10, in the STC group) is comparable to literature data (mean 2.9; range: 1.3–5 in Knowles's review) [6].

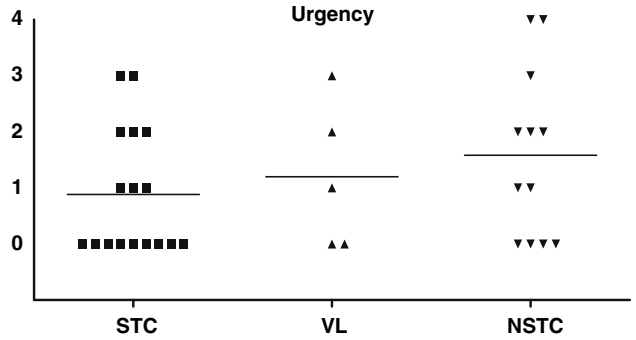

Fig. 5 Distribution of urgency in the subgroups (on a scale from 0 (never) to 4 (always))

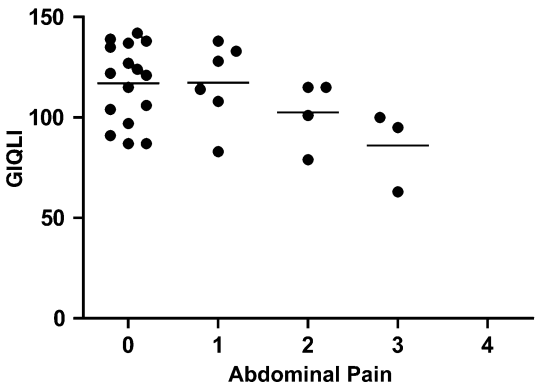

Fig. 6 Correlation between Gastrointestinal Quality of Life Index (GIQLI) and abdominal pain (on a scale from 0 (never) to 4 (always)).

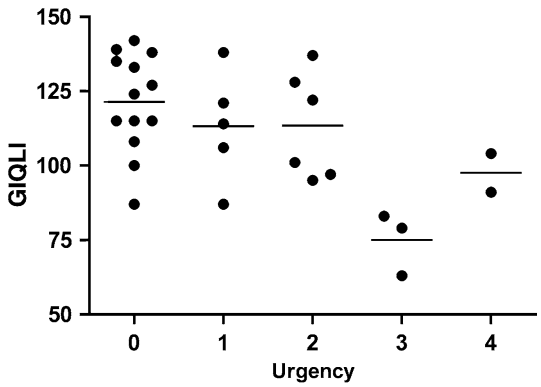

Fig. 7 Correlation between GIQLI and urgency (on a scale from 0 (never) to 4 (always))

The GIQLI mean score in the STC group was 115.5 ± 20.5, higher than in the FitzHarris series (103 ± 22) [12] and not significantly lower than the mean value reported for healthy people during validation studies (125.8 ± 13) [16]. Similar scores were obtained in the VL subgroup (Table 1).

Data regression analysis confirmed a statistically significant correlation between the GIQLI and urgency and abdominal pain, whereas a strong correlation between GIQLI and WI was found, as was reported in the FitzHarris series [12].

In particular, regarding incontinence scores, an average of 3 points (median 2; interquartile range: 0–5) was reported in the STC group. Only an 81-year-old patient presented severe incontinence, and we cannot exclude age-related co-morbidity factors. The data appear satisfactory, especially when compared to other studies (14% of incontinent patients in Knowles's review, 45% in the FitzHarris series) [6, 12].

The urgency mean score (0.88 in the STC group) also resulted as being satisfactory (Fig. 5).

Abdominal pain was reported by 11 of the 17 patients in the STC group (64.7%), although in only 2 cases (11.8%) did it result in being considerably frequent. Frequency distribution does not differ significantly from reports by FitzHarris and other major series [6, 12] (Fig. 4). It is interesting to note that postoperative abdominal pain was significantly more frequent in the STC group than in the NSTC group (mean score 1.02 versus 0.42, $p = 0.04$). The data could be partially explained by a lower mean age of the group (lower pain tolerance), by the postulation of a diffuse intestinal motility disorder in the STC group [13], and, finally, by the frequent presence of psychiatric disturbances in the latter group (abdominal pain being a common epiphenomenon of these).

The high number of patients willing to repeat the procedure (88.2% in the STC group, 100% of the 5 patients in the VL subgroup) is similar to that reported for the FitzHarris series (93%) [12] and is somewhat predictable given the good mean scores of GIQLI.

Limitations of the present study that we cannot afford to neglect are mainly related to the small sample population, the lack of preoperative data on quality of life, the variable length of follow-up, and recall bias on some data (i.e., constipation scores), which were collected at a mean distance of 88 months. Prospective improvements include an increase in sample population and the standardization of the administration times of the GIQLI, which we currently administer routinely before operation.

Conclusions

The study demonstrates that SCCA is an effective option in the surgical treatment of STC. In spite of the limitations noted, it is possible to affirm that the overall impact on the quality of life resulted in our study was more than satisfactory. In comparison with the most homogeneous literature data [6, 12], our procedure does not seem to be inferior to IRA in terms of therapeutic effectiveness, postoperative mortality, and associated morbidity, or in its overall impact on quality of life.

The preservation of such important structures as the ileocecal valve and the cecal reservoir appears to enable SCCA to achieve equal effectiveness at lower rates of postoperative incontinence and urgency, symptoms that clearly have a negative influence on quality of life. The opportunity to perform the intervention video-laparoscopically is another prospective factor of confidence in the procedure, although for a correct evaluation of its possible advantages for the quality of life we will need a comparison with higher-population series.

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