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Sex-related quality of life after total laryngectomy for cancer

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Abstract

Objectives: Analysis of the quality of sexual life after total laryngectomy (TL) for cancer.

Material and Methods: The Cochrane, PubMed, Embase, ClinicalKey and Science Direct databases were searched using the key-words “total laryngectomy, sexual function, sexual behavior, sexual complications, sexual dysfunction, sexuality, intimacy”. The Abstracts of 69 articles were read by two of the authors and 24 articles were selected. The main endpoint was the impact of impairment of quality of sexual life after TL for cancer and the methods used to assess this. The secondary endpoints were the type of sexual impairment, associated variables and their treatment. **Results:** The study population consisted of 1,511 TL patients aged 21 to 90 years, with a male/female sex ratio of 7.49. One of the 7 validated Likert scales was used in 79% of the articles to evaluate impairment of sexual quality of life. Impaired quality of sexual life was reported by 47% of patients on average (range, 5-90%). Erectile and ejaculatory function and ejaculatory behavior of male patients decreased after TL. Other impairments comprised decreases in libido, frequency of sexual intercourse and satisfaction. Tracheostomy, advanced disease stage, young age and associated depression were factors for impairment. 23% of patients reported lack of postoperative support in this area. **Conclusion:** The quality of sexual life is severely impacted by TL for cancer. The present data are a source of information and should be taken into account before carrying out TL. A common information tool needs to be developed. There is patient demand for improved management of sexuality.

Keywords. cancer, larynx, total laryngectomy, quality of life, sexuality.

1.Introduction.

Total laryngectomy (TL) was first described in 1888 by Theodor Billroth [1] and remains the gold-standard treatment for advanced laryngeal cancer due to its unrivalled ability to achieve local control. It is a key to survival, but at the price of permanent tracheostomy, with esthetic blemish, loss of physiological phonation, and severe impairment of quality of life [2,3], notably including impaired self-image [4,5].

On this 150th anniversary of Billroth's description, however, to our knowledge impairment of sexual quality of life after TL for cancer has not been the focus of a specific review of the literature. We therefore searched the Cochrane, PubMed, Embase, ClinicalKey and Science Direct databases, using the keywords "total laryngectomy, sexual function, sexual behavior, sexual complications, sexual dysfunction, sexuality, intimacy". Sixty-nine articles were retrieved and read, and 24 [6–29], constituting a cohort of 1,511 cancer patients with TL, aged 21-90 years, with a male/female sex ratio of 7.49 (**figure 1**), were selected and read by 2 of the authors (EB and NH). They included no meta-analyses or Cochrane reviews. They came from 12 countries: Germany, Brazil, France, Netherlands, Iran, Pakistan, Romania, Sweden/Norway, Türkiye, USA, India and Vietnam: 50% (12/24) and 8% (2/24) came from Europe and from France, respectively (**Table 1**).

The main study endpoints were the incidence of impairment of sexual life after TL for cancer and the means of treatment. Secondary endpoints comprised the type of impairment, associated variables and their treatment.

In line with the movement for better science advocated by the European Annals

Otorhinolaryngology Head & Neck Diseases [30,31], the significance threshold was set at $p < 0.005$, with p -values between 0.05 and 0.005 considered "suggestive".

2. Incidence and assessment of sexual impairment after total laryngectomy for cancer

Overall incidence of sexual impairment as reported in 8 articles was 47% (244/516) [8,12,13,17,22,23,29,32] (**Table 2**). The rate varied greatly between studies, from 5% for Hirani et al. [17] to 90% for Batioğlu-Karaaltın [8]. The 2 French studies on the subject did not report rates [7,9]. Also, the selected articles reported mainly male populations, with a mean age around 60 years, with no control groups matched for age and gender [8,12,13,17,22,23,26,29]. In the general male 60-year-old population, sexual life is strongly affected by general physical health, psychological health, various individual environmental factors and prior level of sexual activity [33]. After 50 years of age, male libido and sexual desire and thoughts tend to diminish [33]; incidence of spontaneous erection diminishes, as does the quality and rate of orgasm [34]. In parallel, biological changes are found, with a fall in total testosterone of 0.4% per year, limiting sexuality as time goes on [35].

In women, testosterone levels progressively decrease by a third over the 20 years following adolescence, but remain stable during and beyond menopause [36]. After the menopause, vaginal lubrication decreases, associated with urogenital atrophy due to a fall in estrogen levels, making the vaginal mucosa more sensitive to trauma related to sexual activity [37]. All of the natural physical and biological changes associated with aging in women contribute to reduced libido [38].

Seven Likert-type scales [39] were used to assess impairment on various dimensions of sexuality (Table 1). They comprised closed questions with a choice of numeric or verbal responses covering a range of opinions on various matters.

The European Organization for Research and Treatment of Cancer Quality of Life Questionnaire Head and Neck Module (EORTC QLQ-H&N35) was the most widely used, in 13 cohorts [40]. It can be combined with the complementary module EORTC QLQ-HNSX [40], with 2 questions: "During the last week have you felt less interest in sex?" and "During the last week have you felt less sexual enjoyment?".

The scales less often used were:

- The Supportive Care Needs Survey (SCNS-SF34) [41] includes a sexuality dimension. The additional SCNS-HNC module is specific to head and neck cancer (1 cohort) [41].
- The 5-item Arizona Sexual Experience Scale (ASEX) [42] assesses sex drive, arousal, penis erection/vaginal moistening, orgasm and satisfaction.
- The International Index of Erectile Function (IIEF) and the short-form IIEF-5 [43] analyzes erectile function, orgasm, libido, sexual satisfaction and global satisfaction.
- The Male Sexual Health Questionnaire (MSHQ-4) assesses ejaculation: force, volume, frequency [44].
- The Female Sexual Function Index (FSFI) assesses libido, arousal, moistening, satisfaction and pain during intercourse [45].
- The Psychosocial Adjustment to Illness Scale (PAIS) assesses sexual relations, with 6 other dimensions unrelated to sexuality [46].

One of the above was used in 79% of studies (19/24): EORTC QLQ-H&N35 in 13; ASEX in 4; and SCNS-SF34, IIEF, MSHQ-4, FSFI and PAIS in 1 each. The other articles (5/24) used non-validated questionnaires.

3. Incidence and typology (libido, erection, ejaculation, satisfaction) of sexual impairment

Data in this area were very heterogenous. The 2 main French studies of quality of life after TL [7,9] did not assess the incidence and typology (libido, erection, ejaculation, satisfaction) of sexual impairment.

Also in France, in a survey by Babin et al. of 150 TL patients, sexuality was diminished for 25% of respondents during the first 6 postoperative months [42]. In 2018, Bui [11] confirmed this: 60 TL patients reported sexual impairment, peaking at 1 month, with decreased libido

[11]. There was improvement over the following year, but scores remained significantly poorer than preoperatively [11,20]. To our knowledge, there are no comparable longer-term data.

Iravani et al. [18], reporting on 21 patients, suggested ($p=0.019$) impaired libido compared to the general population on IIEF, with about a 2-point difference: respectively, mean 4.95 versus 6.84. In 2008, Singer, reporting on 88 TL patients [25], found that 53% had less interest in sex and 48% had decreased libido. On the other hand, only a third of the 151 TL patients reported on by Offerman [22] had diminished interest in sex; but almost a quarter (24%) [22] considered themselves less physically attractive since the operation and had difficulty in accepting their new body image (22%) [22].

Iravani [18] also suggested ($p=0.031$) impaired erectile function compared to the general population ($p=0.031$) on IIEF, with about a 6-point difference: respectively, mean 13.43 versus 19.26. Two scales quantify sexuality-related physical changes [25]. In 2020, Gür used mean IIEF score to assess erectile and ejaculatory function before and after surgery, and MSHQ to assess ejaculatory behavior. TL impaired erection and ejaculation ($p<0.001$) [15]. Sixteen out of 39 male patients showed normal erection preoperatively (IIEF ≥ 26) and 23 showed preoperative erectile dysfunction (IIEF < 26), with no significant difference in postoperative decrease in IIEF score according to preoperative score ($p = 0.197$) [15].

Finally, Iravani [18] suggested ($p=0.006$) decreased satisfaction with sexual relations compared to the general population, with a 4-point difference (respectively, mean 4.6667 versus 8.4211). For Offerman, almost 40% of patients experienced less sexual pleasure after TL [22], as did 57% for Singer [25]. Hirani [17] reported that 98 out of 125 patients (78%) were still satisfied with their sexuality after TL, although the frequency of intercourse was only twice monthly; only 21 patients (17%) reported frequency between 3 and 10 times a month, while 16 (13%) had ceased all sexual intercourse [17]. This radical change in the

frequency of intercourse was confirmed in an interview study [32], two of the three female patients having no sexual relations after TL.

4. Variables affecting sexual impairment after TL

4.1 Tracheostomy

Tracheostomy was the main factor impairing sex-life after TL according to many studies [2,8,13,15,17,22,23,47–49]. It induced fear [47] and diminished sexuality for several reasons: fear of expectoration during intercourse, the impact of breathing on the partner, and a perception of unpleasant smell [48]. Babin et al. [47] highlighted a lack of verbal communication on these issues between partners. The tracheostomy tube had the effect of a disfigurement, impairing intimacy and impacting interest and satisfaction regarding sexual relations, discrediting, stigmatizing or marginalizing the TL patient [49]. Disfigurement and the feeling of no longer fully being a man or woman were important reasons why sexual relationships changed after TL. The feeling of being less attractive led to self-isolation [22]. Öztürk et al. [23] reported that 48% of a cohort of 25 TL patients reported embarrassment on meeting others and unease due to the tracheostomy, the bad smell and noisy breathing. These functional consequences disturbed normal relations and the development of sexuality. Lack of desire from the partner could lead to avoidance or refusal of sexual contact [17].

4.2 Vocal rehabilitation

Type of vocal rehabilitation (esophageal voice, electrophone, trachea-esophageal voice, no rehabilitation) seemed not to affect EORTC H&N35 sexuality subscore ($p=0.11$) in a Romanian study of 65 patients [28]. On the other hand, Triple et al. [28] found a significant direct Pearson correlation between total VHI and EORTC H&N35 sexuality subscore, with higher sexual dysfunction scores associated with more severe voice disorder ($r=0.183$; $p<$

0.001). On the other hand, Polat et al. [24] found no improvement in sexual dysfunction comparing ASEX scores before and after voice prosthesis implantation in 26 patients [24]; 25 patients showed no change in score and only 1 progressed toward nearly normal sexual function (normal = ASEX<10) [24]. On close analysis of ASEX scores, however, mean scores were significantly lower after implantation, falling from 17 (range, 5–30) to 15 (range, 5–28) ($p < 0.003$).

4.3 Other factors

Apart from the above 2 factors, 4 articles [8,22,25,29] referred to other variables affecting quality of life after TL for cancer. Low educational level, smoking and alcohol consumption, adjuvant radiation therapy and laryngeal tumor location are known to impair quality of sexual life. In contrast, Singer et al. [25] reported that advanced (stage III-IV) disease and depression were the only factors associated with impaired quality of sexual life, In Türkiye in 2015, Yilmaz et al. [29] reported that a quarter of female TL patients felt less feminine and attractive, impairing their sexuality. In 2017 in Türkiye, Batioğlu-Karaaltın et al. [8] reported that advanced disease stage aggravated sexual disorder. Offerman reported that TL patients with greater comorbidity had more severe sexual problems ($p<0.01$), and that older patients reported more sexual problems ($p<0.01$) [22].

Treatment-related factors are also involved. In Singer's survey [25], associating radiation therapy to TL had no significant impact ($p=0.31$) on the EORTC H&N35 sexuality subscale but advanced disease (I+II versus III+IV) showed a suggestive impact ($p=0.04$).

5. Impact on partners

Six articles assessed the impact of TL on partners' sexuality [15,17,22,50–52]. Offerman et al., in a survey of 144 wives of TL patients, found that 33% reported deterioration in sexual

relations and intimacy after TL [22]. Gür [15] reported that mean FSFI decreased significantly after TL for all female partners ($p < 0.001$), with large deterioration in libido (from 3.60 to 2.70; $p = 0.002$), arousal (from 4.09 to 1.87; $p < 0.001$), moistening (from 4.51 to 2.53; $p = 0.001$), orgasm (from 4.54 to 2.00; $p < 0.001$), satisfaction (from 4.34 to 2.04; $p = 0.001$) and pain (from 5.04 to 2.80; $p = 0.001$) [15].

In 2015 in the Netherlands, Offerman [22] reported that TL led to communication problems for a fifth of patients and partners, with a feeling of dependency upon the partner for a third of patients. Partners reported that the relationship was emotionally and physically stressful [52]. Partners reported how badly the patients were affected by fear, especially regarding breathing, a feeling of shame in regard to the tracheostomy and disfigurement, and the feeling of not being fully a man or woman; such doubts and questions were important reasons for the change in the sexual relationship postoperatively [22].

6. Management of sexual impairment after TL

The literature on this subject is sparse: only 2 of the 24 studies dealt with the management of sexual impairment after TL; in France, to our knowledge, there are no guidelines to help patients manage their sex lives after TL [19,22].

In the first of the 2 studies, Offerman [22] found that patients' complaints centered around a lack of information and the taboo on talking about sex when afflicted by a life-threatening disease. What patients and partners wanted was to be accompanied, to learn methods of relaxation, to be able to consult their doctor so as to understand and be listened to, and to meet with a psychologist [22], as previously advised by Myers [45] in 1999. In the second study, also in the Netherlands, Jansen, reporting on 283 TL patients, estimated a 23% rate of unmet needs for support care related to sexuality [19]. Complaints were generally ignored: changes in sexual feelings and relationships, and a lack of information on sexual relations [19].

Deficient management of sexual disorder is not seen only in TL. Rhoten [53] highlighted it more generally in head-and-neck cancer: almost a quarter of patients reported unmet needs for information and help regarding sexuality, 80% (61/75) would have wanted to be informed about sexual impact at diagnosis, and half wished to talk about this with a member of the care team: surgeon, oncologist or nurse [53].

7. Conclusion

Total laryngectomy impacted both patients and partners, negative effects being reported in more than 30% of cases. The physical transformation has esthetic and emotional impact, inhibiting sexuality.

The present review of the literature highlights how badly the quality of sexual life is impaired by TL for cancer. The data, however, comprise several biases: low sample size (14 of the 24 selected studies having fewer than 50 patients), use of non-validated questionnaires in 4 studies (16% of cases), and lack of detail for percentages reported in 16 articles. However, 3 lessons can be drawn from this review. Firstly, a consensually recognized tool should be developed to assess quality of sexual life after TL. Secondly, and more practically, the present data now enable ENT physicians to inform the patient, as required by French law, of the impairment in quality of sexual life to be expected after TL for cancer, a subject that is too often a taboo for patients and care-givers. Thirdly, TL patients hope for improvement in the management of the impairment of sexual life after TL for cancer, and further studies here would be welcome.

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Figure 1: Flowchart

¹Search-terms: "total laryngectomy" AND ("sexual function" OR "sexual behavior" OR "sexual complications" OR "sexual dysfunction" OR "sexuality" OR "intimacy")

Article (Country)	TL Population	Type of study	TL sample M/F	Age (years) of TL patients (mean)	Age (years) of TL patients (range)	Assessment instrument
Akil 2017 (Türkiye)	51 TL; 31 EPL	Prospective (cross-sectional)	51M	63	43-84	EORTC QLQ-H&N35 et ASEX
Apert 2022 (France)	49 TL	Prospective (observational)	43M/6F	61	40-81	EORTC QLQ-H&N35
Batioglu 2017 (Türkiye)	72 TL; 36 EPL	Prospective	72M	60 +/- 8	47-80	EORTC QLQ-H&N35 et ASEX
Bozec 2021 (France)	48 TL	Prospective	45M/3F	64	ND	EORTC QLQ-H&N35
Braz 2005 (Brazil)	14 TL; 16 EPL	Prospective	12M/2F	61	ND	EORTC QLQ-H&N35
Bui 2018 (Vietnam)	42 TL; 60 EPL; 38 corpectomy; 39 TL + adjuvant RT	Prospective (cohort)	41M/1F	71% > 50	38 - 77	EORTC QLQ-H&N35
Desanto 1995 (USA)	111 TL; 38 STL; 23 PL	Prospective	76M/35F	64	26-84	PAIS questionnaire
Deshmane 1995 (India)	50 TL	Prospective	50M	90% > 40	36-90	Questionnaire adapted by author
Dinescu 2015 (Romania)	66 TL; 14 EPL; 20 controls	Retrospective (case-control)	65M/1F	60	ND	EORTC QLQ-H&N35
Gür 2020 (Türkiye)	26 TL; 13 EPL; 39 partners	Retrospective	26M	61 +/- 8	37-83	IIEF-5, MSHQ-4 et FSFI
Hanna 2004 (USA)	23 TL	Prospective (multicenter RCT)	20M/3F	65	ND	EORTC QLQ-H&N35
Hirani 2015 (Pakistan)	125 TL	Prospective (analytical study)	120M/5F	55	31-65	Questionnaire adapted by author
Iravani 2022 (Iran)	21 TL	Cross-sectional case-control	21M	57	42-75	IIEF
Jansen 2018 (Netherlands)	283 TL	Prospective (cross-sectional)	237M/46F	70	ND	Supportive Care Needs Survey [SCNS] + SCNS-HNC module
Jansen 2020 (Netherlands)	92 TL	Prospective (multicenter RCT)	77M/15F	65	ND	EORTC QLQ-H&N35
Nordgren 2003 (Sweden/Norway)	13 TL	Prospective (multicenter longitudinal)	12M/1F	61	21-88	EORTC QLQ-H&N35
Offerman 2015 (Netherlands)	144 TL patients' partners or family; 151 TL	Prospective	129M/22F	68	ND	Questionnaire adapted by author
Osturk 2013 (Türkiye)	19 TL; 6 EPL	Prospective	19F	58.8 +/- 10	ND	Questionnaire adapted by author
Polat 2015 (Türkiye)	34 TL	Prospective (before/after)	34M	59 +/- 6	48-75	ASEX
Sewnaik 2005 (Netherlands)	11 TL; 12 EPL	Retrospective	9M/2F	NA	54-82	EORTC QLQ-H&N35
Singer 2008 (Germany)	88 TL; 118 EPL	Prospective (multicenter cross-sectional)	82M/6F	76 % <65; 45 % > 65	ND	EORTC QLQ-H&N35
Tiple 2016 (Romania)	65 TL	Retrospective	62M/3F	59	ND	EORTC QLQ-H&N35

Van Sluis 2020 (Netherlands)	8 TL	Prospective (qualitative descriptive study by semidirective interview)	8F	54	ND	Questionnaire adapted by author
Yılmaz 2015 (Türkiye)	49 TL; 25 EPL	Retrospective (cross-sectional)	49M	62	43-84	ASEX

Table 1: Characteristics and results of included studies

TL: total larynectomy; EPL: external partial larynectomy; S□L: subtotal larynectomy; RT: radiotherapy; M: male; F: female; ND: no data

Quality-of-life scales: ASEX, EORTC QLQ-H&N35, IIEF-5, MSHQ-4 and FSFI

	Number of patients	Patients with impairment	Percentage
Batioglu 2017	72	65	90
Desanto 1995	50	10	20
Deshmane 1995	50	31	62
Hirani 2015	125	7	5,6
Offerman 2015	148	65	44
Osturk 2013	17	15	88
Van Sluis 2020	3	2	67
Yilmas 2015	49	29	59
TOTAL	516	244	47

Table 2: Sexual impairment after TL

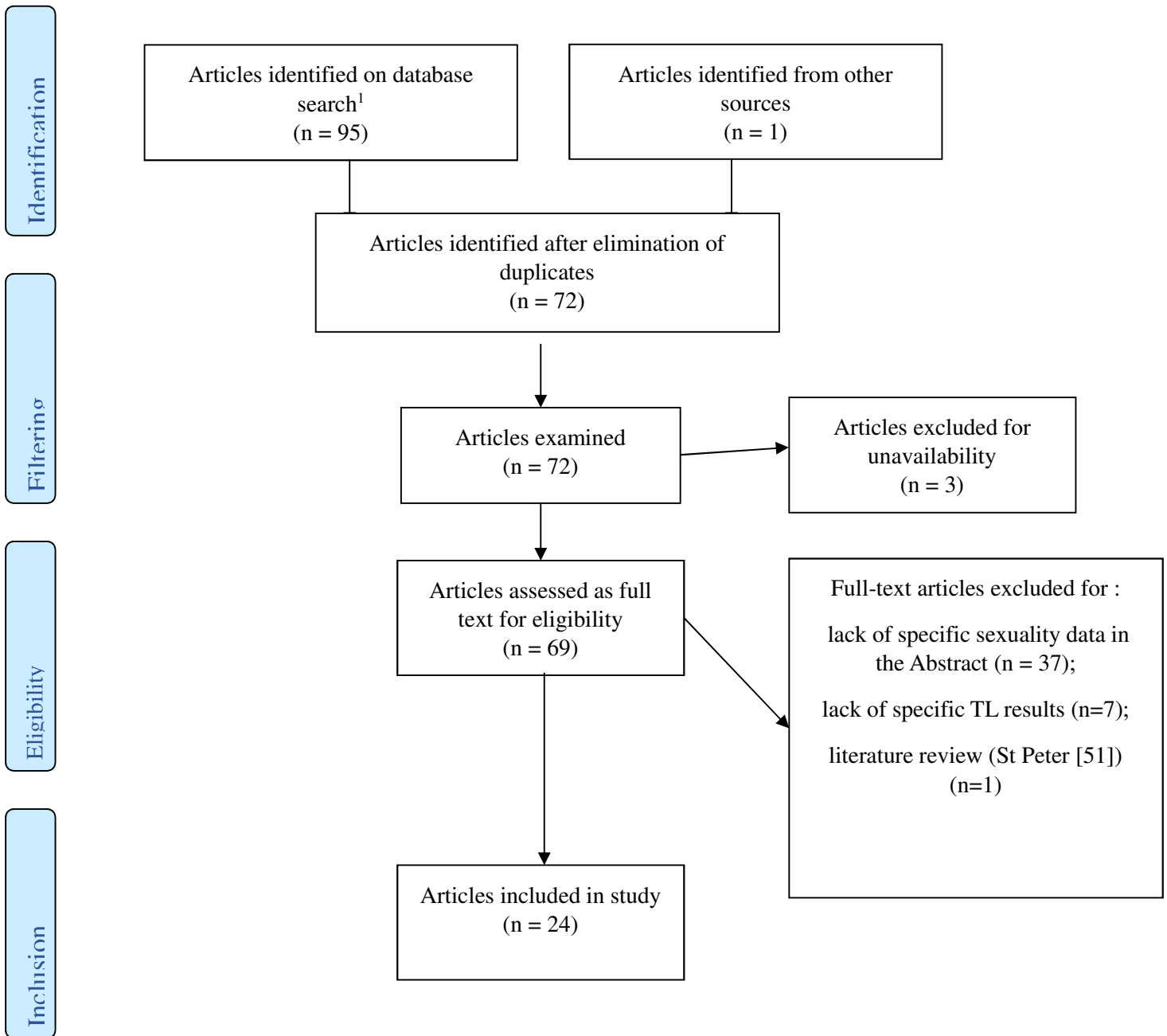


Figure 1: Flowchart

¹Search-terms: "total laryngectomy" AND ("sexual function" OR "sexual behavior" OR "sexual complications" OR "sexual dysfunction" OR "sexuality" OR "intimacy")