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# Seminal vesicle status and its association with semen parameters in congenital bilateral absence of the vas deferens (CBAVD)

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## Abstract

**Background** Congenital bilateral absence of the vas deferens (CBAVD) is a rare condition associated with male infertility. CBAVD is often accompanied by other genitourinary anomalies, including abnormalities or agenesis of the seminal vesicles and kidneys. While it is expected that CBAVD always coexists with seminal vesicle agenesis due to a shared embryologic origin, some studies report the presence of seminal vesicles in certain CBAVD patients. This study aims to assess the status of seminal vesicles in CBAVD patients and explore the relationship between seminal vesicle presence and semen parameters.

**Methods** In this multi-center, retrospective cross-sectional study, we reviewed data from 47 CBAVD patients diagnosed between 1994 and 2024. Data collected included demographic information (age, height, weight, BMI), physical examination findings (vas palpation), and imaging results (trans-rectal ultrasound for seminal vesicle status, abdominal and pelvic ultrasound for kidney status). Laboratory data included serum FSH, LH, and testosterone levels, as well as semen analysis results (pH, fructose, and volume). Patients were classified into three groups based on seminal vesicle status: bilateral agenesis, unilateral agenesis, and bilateral presence.

**Results** Among the 47 CBAVD patients, 29 had bilateral agenesis of the seminal vesicles, 9 had unilateral agenesis, and 9 had bilateral presence. No significant differences were found between the groups regarding weight, height, BMI, or serum levels of LH, FSH, and testosterone. Additionally, semen analysis revealed that 89.4% of patients had abnormal pH, 93.6% had abnormal volume, and all patients had abnormal semen fructose. There were no significant differences between the groups in semen pH, fructose, or volume.

**Conclusion** Our findings suggest that the presence or absence of seminal vesicles in CBAVD patients does not significantly affect semen parameters. This may be due to dysfunction of the seminal vesicles in those with a present organ.

**Keywords** CBAVD, Vas deferens, Seminal vesicle, Infertility

## Résumé

**Contexte** L'absence bilatérale congénitale du canal déférent (CBAVD) est une maladie rare associée à l'infertilité masculine. La CBAVD s'accompagne souvent d'autres anomalies génito-urinaires, notamment des anomalies ou une agénésie des vésicules séminales, et des reins. Bien que l'on s'attende à ce que la CBAVD coexiste toujours avec

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notable for CBAVD with normal semen fructose and volume.

However, among 47 patients of our study, only three had normal semen volume, and interestingly, none of these patients had bilateral seminal vesicles. There was no significant difference in semen parameters between patients with and without SV who had CBAVD. Our findings were in the same line with those of the study by Taille et al., in which semen variables (pH < 7.2, fructose < 1 g/L, and ejaculate volume < 2 mL) did not differentiate patients with or without SV anomalies [24]. So, it can be concluded that the presence of SV with normal appearance in patients with CBAVD does not necessarily indicate functional competence. Regardless of their presence or absence, SVs are unable to contribute effectively to seminal fluid production due to underlying dysfunction, whether or not a functional epithelium is present.

Another study evaluated 26 men with CBAVD with computerized tomographic scans [8]. They found seminal vesicles bilaterally in 12 of these men, unilateral hypoplasia or absence in 8, and bilateral hypoplasia or absence in 6 subjects. They failed to find reconstructable vas deferens when exploring the patients with bilateral or unilateral present SV. Thus, they concluded that low ejaculate volume and absence of semen fructose in men with CBAVD may be related to ejaculatory duct problems rather than SV. They did not find significant differences among semen parameters between these men, like our results, but we mentioned that abnormality in semen parameters in patients with CBAVD that had normal SV might be related to dysfunction of SV rather than ejaculatory duct anomalies.

In our study, 40 patients had normal kidneys, four had ectopic kidney, and three had kidney agenesis. Although our results demonstrated that all kidney abnormalities were observed in patients with SV abnormalities, we found no significant association between kidney anomalies and the presence or absence of SV. Results of a study conducted on 26 cases of CBAVD demonstrated that four patients had unilateral kidney agenesis, and one patient had a hypoplastic pelvic kidney. All four men with unilateral kidney agenesis had ipsilateral absence of the SV [8]. Another study showed that among 168 cases of CBAVD, 17 men had unilateral kidney agenesis. However, no significant difference was observed in the seminal vesicle status between the group with both kidneys and the group with a single kidney [21]. It seems that kidney anomalies cannot be predicted in CBAVD patients with SV agenesis.

To the best of our knowledge, this study is one of the few studies that have evaluated the relationship between the presence or absence of SV with semen parameters and kidney abnormalities in CBAVD patients.

Small sample size is an important limitation of our study. Because of the retrospective design of our study, we had to exclude some patients with missing profile data. Also, one of the major limitations of this study was the absence of genetic variant analysis of the CFTR gene mutations. Due to the prohibitively high costs, genetic analysis of CFTR mutations has performed only on the spouses of the study cases. As all results were negative, genetic variant screening for these genes was not conducted in the study participants.

Additionally, the seminal vesicle volume, if present, was not measured, which highlights the need for further research in this area.

## Conclusion

Based on our findings, the presence or absence of SV in CBAVD does not significantly affect semen parameters. This is because, even when SV are present, they do not effectively contribute essential seminal fluid components, regardless of epithelial functionality.

Further studies to evaluate the seminal vesicles and the causes of their dysfunction in these patients are recommended.

## Abbreviations

|       |                                                     |
|-------|-----------------------------------------------------|
| CBAVD | Congenital bilateral absence of the vas deferens    |
| CF    | Cystic fibrosis                                     |
| SV    | Seminal vesicle                                     |
| CUAVD | Congenital unilateral absence of the vas deferens   |
| TRUS  | Trans-rectal ultrasound                             |
| FSH   | Follicle stimulating hormone                        |
| LH    | Luteinizing hormone                                 |
| CFTR  | Cystic fibrosis transmembrane conductance regulator |

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## Authors' contributions

ISh, AH, AE, MASG, AA and SSK assisted in conceptualization and design of the study, oversaw data collection, conducted data analysis and drafted the manuscript. ISh and SSK conceptualized and designed the study, assisted in data analysis and reviewed the manuscript. ISh, AH, AE, MASG, AA and SSK assisted in study conceptualization and reviewed the manuscript. All authors read and approved the final manuscript.

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## Data availability

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

## Declarations

### Ethics approval and consent to participate

Ethical approval was obtained from the Human Research Ethics Committee at the Shiraz university of medical sciences. All study participants provided written informed consent. Permission was also obtained to digitally record all interviews. Informed consent from legally authorized representatives for study participation for illiterate participants. Confidentiality and anonymity were