Original Article

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Clinical Profile, Laboratory Findings and Radiological Evaluation of Sheehan's Syndrome: A Retrospective Observational Study from a Tertiary Centre from North-Western India

Internal Medicine Section

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ABSTRACT

Introduction: Sheehan's Syndrome (SS) is postpartum hypopituitarism which occurs due to ischaemic necrosis of pituitary because of shock or severe hypotension secondary to massive Postpartum Haemorrhage (PPH). Few studies on SS originate from Northwest India.

Aim: To characterise the clinical profile, laboratory findings, and radiological features of SS.

Materials and Methods: The present retrospective observational study reviewed 46 SS patients admitted over 30 months (July 2022-December 2024) at Sardar Patel Medical College, Bikaner, Rajasthan in Northwest India. Women diagnosed with SS based on PPH history with amenorrhoea and/or lactation failure, hypopituitarism, and/or empty sella syndrome were enrolled, excluding those with pre-existing endocrine disorders, alternative hypopituitarism aetiologies, or incomplete records. Demographic and anthropometric parameters, clinical presentation, history of PPH, duration of amenorrhoea, failure of lactation, laboratory and endocrine profile, and imaging characteristics were recorded and analysed. Continuous variables were expressed as mean±Standard Deviation (SD); categorical variables as counts and percentages.

Results: The mean age at diagnosis was 38.2±12.5 years, and the mean diagnostic delay was 12.1±5.5 years. Secondary amenorrhoea and agalactia were the most common clinical findings. History of home delivery, PPH, and blood transfusion were present in 30 (65.2%), 40 (87%), and 22 (47.8%) patients, respectively. Out of 46 patients, 14 (30.4%), 14 (30.4%), and 15 (32.6%) patients presented with altered sensorium, shock, and hypoglycaemia, respectively. Loss of Axillary or Pubic hair, asthenia, and psychosis were present in 41 (89.1%), 41 (89.1%), and 5 (10.9%) patients, respectively. Anaemia and hyponatraemia were present in 43 (93.5%) and 31 (67.4%) patients, respectively. Total and partial empty sella were recorded in 36 (78.3%) and 10 (21.7%) patients, respectively. On anterior pituitary hormonal analysis, all 46 (100%) patients had low-normal gonadotropins, 41 (89.1%) had adrenal insufficiency, 42 (91.3%) had secondary hypothyroidism, and 37 (80.4%) had low prolactin levels. Bone Mineral Density (BMD) assessment (n=11) was suggestive of osteopenia.

Conclusion: The SS resulted in combined pituitary hormone deficiencies in most patients. Secondary amenorrhoea and agalactia were the most common presenting features, serving as early clues to suspect SS and initiate appropriate diagnostic workup.

Keywords: Amenorrhoea, Lactation disorders, Pituitary necrosis, Postpartum haemorrhage

INTRODUCTION

The SS, first described by Harold Leeming Sheehan in 1937, is postpartum hypopituitarism occurring due to ischaemic necrosis of pituitary because of shock or severe hypotension secondary to massive haemorrhage during or just after the delivery [1]. After sellar mass, SS is a common cause of hypopituitarism in developing countries like India but is rare in developed countries [2]. Estimated prevalence of SS in India ranges from 2.7% to 3.9% in reproductive age women, which is higher in contrast to developed countries (5 per 100,000 women) [3]. The pituitary, a highly vascularised gland, doubles in volume during pregnancy due to lactotroph hyperplasia from elevated oestrogen levels [4]. Factors involved in pathogenesis of SS include genetic susceptibility, presence of pituitary antibodies, small sella size, enlargement of pituitary gland and Disseminated Intravascular Coagulation (DIC) because of massive PPH, hypovolaemia, and shock. Sequence of events in pathogenesis of SS is extreme vasospasm followed by thrombosis and vascular compression of the hypophyseal arteries [5].

The diagnosis of SS is not always evident immediately after delivery and it may take years to diagnose, rarely SS can present acutely. SS is characterised by varying degrees of anterior pituitary dysfunction, which are characterised by nausea, intractable vomiting, anorexia, asthenia, dizziness, weight loss, shock, altered level of consciousness, and seizure with history of amenorrhoea and agalactia after last delivery [6]. The pattern of involvement of anterior pituitary is variable, with gonadotroph and somatotroph cell involvement in most of cases, followed by involvement of thyrotroph, lactotroph, and corticotroph [7]. In developing countries like India, where obstetric care is poor and home deliveries are commonly conducted, SS is a leading cause of hypopituitarism [8]. The data from north-western part of India is sparse [3,9]. The present study was planned to comprehensively evaluate SS patients, focusing on demographic characteristics, clinical profile, endocrine dysfunction, and radiological findings.

MATERIALS AND METHODS

The present retrospective observational study was conducted in the Department of Endocrinology at Sardar Patel Medical College, Bikaner, Rajasthan (Northwest India). Patient records from July 2022 to December 2024 (30-month period) were retrospectively reviewed and compiled between January and June 2025. The study was approved by Institutional Review Board of the Institute (No: F. 29(Acad)SPMC/2025/5107).

Sample size calculation: The sample size was calculated using the formula $n=Z^2\times p\times(1-p)/d^2$ (where Z=1.96 for 95% confidence, p=4% prevalence from literature [10], and d=10%), with a 10% non-response adjustment, yielding 17 participants; ultimately, 46 women were enrolled.

Inclusion criteria: Women diagnosed with SS were enrolled based on a history of amenorrhoea and/or lactation failure following PPH during their last delivery, evidence of hypopituitarism, and/or radiological findings such as empty sella on Magnetic Resonance Imaging (MRI) [11].

Exclusion criteria: We excluded women with pre-existing endocrine disorders (e.g., thyroid disease, adrenal insufficiency, pituitary abnormalities prior to PPH), other causes of hypopituitarism (e.g., tumours, trauma) and incomplete medical records.

Study Procedure

Definition: Hypopituitarism was diagnosed by presence of one or more of the following: (i) low or inappropriately normal gonadotropins in background of amenorrhoea; (ii) 8 AM cortisol less than 3 µg/dL or a stimulated cortisol (sample for cortisol taken 60 min after intramuscular injection of Synacthen 250 µg) less than 18 µg/dL; (iii) free T4 less than 0.61 ng/dL (Normal range 0.61-1.12 ng/dL) in the presence of inappropriately normal or low Thyrotropin (TSH); (iv) serum prolactin level between 9-21 ng/mL; and (v) serum Insulin like Growth Factor-1 (IGF-1) level less than age and sex specific reference range (lowest detection limit 3 ng/mL). Low IGF-1 was taken as evidence of Growth Hormone (GH) deficiency in presence of other anterior pituitary hormone deficiency [5].

Data collection: Case-records of subjects with SS were evaluated for demography, anthropometry, vitals, clinical presentation, history of PPH, duration of amenorrhoea, failure of lactation, laboratory and endocrine profile, and imaging characteristics.

Laboratory procedures: All the hormonal analysis was done by Beckman Coulter UniCel DxI 800 Immunoassay System using solid-phase chemiluminescent enzyme immunoassay except IGF-1, which was done by DiaSorin LIAISON XL using Chemiluminescent Immunoassay (CLIA). MRI (3.0T; Ingenia, Philips Netherland) of pituitary was done in all subjects. BMD of lumber spine (L1-L4) was evaluated by dual energy X-ray absorptiometry (OsteoPro DEXA) using standardised database of WHO [12].

STATISTICAL ANALYSIS

Statistical analyses were performed using Statistical Packages for the Social Sciences (SPSS) version 24.0 (IBM Corp, Armonk NY, USA). Normality of distribution of the data was assessed by Shapiro-Wilk test. Continuous data were expressed as mean±SD and categorical data were expressed as counts and percentage.

RESULTS

In the present study, 46 patients with SS were included. The mean (±SD) age of the subjects was 38.2 (±12.5) years. The mean interval between the last childbirth and the diagnosis of SS was 12.1±5.5 (Range 1.5-25) years. At the time of diagnosis, their mean body weight was 49.2 (±6.3) Kg, and their mean Body Mass Index (BMI) was 19.9 (±2.6) kg/m^2. The number of pregnancies ranged from 2 to 9, with a mean of 3.9 (±1.1). The mean systolic and diastolic blood pressures were 102.4±18.1 and 65.5±9.5 mm/Hg at the time of diagnosis. Out of 46 subjects, 27 (58.7%) resided in a rural area, 39 (84.8%) were Hindu, and 7 (15.2%) were Muslim by religion. Demographic, anthropometric, and clinical characteristics are described in [Table/Fig-1].

Parameters	Mean±SD/n (%)
Age at diagnosis (years)	38.2±12.5
Diagnostic delay (years)	12.1±5.5
Parity	3.9±1.1
Weight (Kg)	49.2±6.3
BMI (Kg/m^2)	19.9±2.6
Systolic BP mm/Hg	102.4±18.1
Diastolic BP mm/Hg	65.5±9.5
Residence (Rural/Urban)	27 (58.7%) /19 (41.3%)
Religion (Hindu/Muslim)	39 (84.8%) /7 (15.2%)

[Table/Fig-1]: Demographic, anthropometric, and clinical characteristics of SS patients at presentation (n=46).
SD: Standard deviation; BMI: Body mass index

Out of 46 patients, a history of PPH was present in 40 patients, massive haemorrhage requiring blood transfusion was present in 22 patients, and 30 women delivered at home. Twenty-nine subjects never breastfed after the last delivery, while seven had breastfed their child for 1-2 months, and three had still birth, hence lactation was not recorded in them. Thirty-one women never menstruated after last child birth while 15 women menstruated for 1-3 years, and one woman had a successful pregnancy after the inciting event. Ten out of 46 patients presented with a history of altered sensorium and documented hypoglycaemia. Three of them had a history of altered sensorium, documented hypoglycaemia, and shock, and two patients had a history of repeated loss of consciousness recovered after fluid infusion. Fourteen out of 46 patients presented with shock, and six out of them had repeated emergency visits with hypotension, which resolved with intravenous (i.v.) fluid. Three patients solely presented with hypoglycaemia. Overall, altered sensorium, hypoglycaemia, and shock were present in 14, 15 and 14 patients, respectively.

Out of 46 patients, 31 had mild to severe hyponatraemia at the time of presentation, and on inquiry, 41 patients reported loss of pubic and axillary hairs a few years after the inciting event. Three patients visited the Outpatient Department with chronic complaints of asthenia, nausea, anorexia, weight loss, dizziness, particularly in summer, and poor quality of life, though 41 patients had a history of asthenia before presentation. Five patients had acute psychosis at the time of presentation. Echocardiography was performed in 11 patients, of whom two patients had left ventricular systolic dysfunction. Out of 46 patients, 28 had normocytic normochromic anaemia and 15 had microcytic hypochromic anaemia. All 46 had gonadotroph deficiency, 41 (89.1%) had corticotroph deficiency, 42 (91.3%) had thyrotroph deficiency, 37 (80.4%) had lactotroph deficiency, and out of 12 patients in whom IGF-1 estimation was done, 10 (85.7%) had somatotroph deficiency. On MRI, empty sella and partial empty sella were found in 36 and 10 patients, respectively. Secondary amenorrhoea and agalactia were the most common presenting features.

The present study observed lower mean levels of Free Thyroxine (FT4), stimulated cortisol, prolactin, serum sodium, and haemoglobin. Details of clinical, radiological, and laboratory findings are described in [Table/Fig-2,3]. The BMD data were available in 11 SS patients at the time of diagnosis and are shown in [Table/Fig-4].

DISCUSSION

The SS, originally described by HL Sheehan, is a type of hypopituitarism characterised by necrosis of pituitary after PPH and shock, which may present either immediately or after several years of diagnostic delay with wide range of manifestations, depending on the extent of pituitary destruction [13].

In the present study, the mean age of SS patients at the time of diagnosis was 38.2±12.5 years, which is in line with findings of Khare J et al., (36.65±3.36) [14]. Out of 46 women with SS, 22 (47.8%) were younger than 40 years, 27 (58.7%) were from rural areas, 30 (65.2%) had a home delivery, which is in line with an epidemiological study done in Kashmir valley (66% were younger than 40 years, 67.8% were from rural areas, 63% had a home delivery) [10]. Home

Parameters		n (%)
Age (years)	≤40	22 (47.8%)
	>40	24 (52.2%)
Home delivery		30 (65.2%)
Postpartum Haemorrhage (PPH)		40 (87%)
Blood transfusion		22 (47.8%)
Lactation failure* (n=43)	Immediate	29 (67.4%)
	Delayed	7 (16.3%)
Amenorrhoea	Immediate	31 (67.4%)
	Delayed	15 (32.6%)
Altered sensorium		14 (30.4%)
Shock		14 (30.4%)
Hypoglycaemia		15 (32.6%)
Hyponatraemia		31 (67.4%)
Loss of axillary or pubic hair		41 (89.1%)
Asthenia		41 (89.1%)
Psychosis		5 (10.9%)
LV dysfunction† (n=11)		2 (18.2%)
Anaemia	Normocytic normochromic	28 (60.9%)
	Microcytic hypochromic	15 (32.6%)
Corticotroph deficiency		41 (89.1%)
Gonadotroph deficiency		46 (100%)
Thyrotroph deficiency		42 (91.3%)
Lactotroph deficiency		37 (80.4%)
Somatotroph deficiency‡ (n=12)		10 (83.3%)
Total empty sella		36 (78.3%)
Partial empty sella		10 (21.7%)

[Table/Fig-2]: Clinical and radiological characteristics of SS patients at presentation (n=46).
*Out of 46 patients, three had still birth, hence failure of lactation was recorded in the 43 patients; † 2D Echocardiography were done in 11 SS patients, out of which two patients had left ventricular ejection fraction less than 40%; ‡ IGF-1 estimation was done in 12 patients, out of which 10 patients had level below reference range; LV: Left ventricular

Hormone (reference range)	Mean±SD
FT4 (0.61-1.12 ng/dL)	0.34±0.14
TSH (0.38-5.33 µIU/mL)	2.63±1.61
Basal cortisol (6.6-22.6 µg/dL)	7.11±2.90
Stimulated Cortisol (>18 µg/dL) (n=9)	15.83±3.75
LH (2.12-10.89 IU/L)	3.51±2.26
FSH (2-10 IU/L)	3.65±1.67
Prolactin (9-21 ng/mL)	4.07±3.98
IGF-1 (55-398 ng/mL) (n=12)	57.77±29.54
Serum sodium (135-145 mM/L)	133.20±5.48
RPG (70-110 mg/dL)	71.22±2.76
Haemoglobin (12-15 g/dL)	9.89±1.24

[Table/Fig-3]: Laboratory and hormonal profile of SS patients at presentation (n=46).
FT4: Free tetraiodothyronine; TSH: Thyrotropin; LH: Luteinising hormone; FSH: Follicle stimulating hormone; IGF-1: Insulin like growth factor-1; RPG: Random plasma glucose; SD: Standard deviation

S. No.	Age (years)	Lumbar spine Z-score	Lumbar spine T-score
1	63	-2.6	-2.9
2	58	-2.1	-2.7
3	31	-1.2	-1.3
4	26	-1.1	-1.6
5	27	-1.1	-1.2
6	49	-0.5	-1.1
7	45	-2.4	-2.9
8	45	-1.8	-2.2
9	28	-1.2	-1.3
10	37	-1.8	-2.1
11	29	-1.1	-1.3

[Table/Fig-4]: Bone Mineral Density (BMD) of SS patients (n=11).
BMD data were available in 11 SS patients at the time of diagnosis. All patients had osteopenia (T-score < -1) and 3 patients had osteoporosis (T-score < - 2.5)

delivery is an important risk factor for Sheehan syndrome, because it is usually associated with poor obstetric care, which results in increased incidence of unrecognised or poorly managed PPH [3].

In the present study, a mean diagnostic delay of 12.1±5.5 (range,1.5-25) years was observed, which is similar to a study done by Khare J et al., (11.21±3.43 years, 1-19) [14]. In contrast Huang YY et al., observed mean diagnostic delay of 18 (range 1-33) years [15]. This decade-long delay in diagnosis is probably due to mild or vague symptoms of asthenia seen in 89% of patients in the present study, and partial pituitary damage may be compensated initially, resulting in missed recognition or misdiagnosis in earlier years [16]. This diagnostic delay can result in life-threatening presentations like altered sensorium, shock, and hypoglycaemia, as occurred in nearly one-third of our patients.

Failure to resume menstruation and lactation failure were the most common symptoms and were reported in 100% (67.4% immediate and 32.6% delayed) and 83.7% (36 out of 43 evaluable patients) of the patients, respectively, which was similar to findings of Sunil E et al., (amenorrhoea in 100%, agalactia in 72%) and Dokmetas HS et al., (amenorrhoea in 100%, agalactia in 70%) [16,17]. History of PPH was reported in 87% of the SS patients, which was in line with Dokmetas HS et al., (90%) and Sunil E et al., (89%) [16,17]. Hypotension due to PPH results in necrosis of the anterior pituitary during the last childbirth. Along with pituitary necrosis, autoimmunity, and DIC have been proposed to play a role in the pathogenesis of SS [18,19].

Hyponatraemia was observed in 31 (67.4%) SS patients, which was higher in contrast to studies done by Dokmetas HS et al., (35%) and Mandal S et al., (52.6%) [5,17]. Hyponatraemia is probably due to secondary adrenal insufficiency and secondary hypothyroidism, which were seen in 89.1% and 91.3% patients, respectively, which was in line with a study done by Patto SM et al., (95.3% and 96%, respectively) [20]. Dokmetas HS et al., observed secondary adrenal insufficiency and secondary hypothyroidism in 55% and 90% patients, respectively [17]. Diri H et al., in their review described secondary adrenal insufficiency and secondary hypothyroidism in 53-96% and 57-90% SS patients, respectively [21]. Before starting the treatment of hypothyroidism, adrenocortical insufficiency should be ruled out to prevent adrenal crisis [14].

Secondary adrenal insufficiency is one of the most dreaded manifestations of SS, and its presentation is variable ranging from non-specific presentations (e.g., weakness, fatigue) to life threatening adrenal crisis [14]. It is main cause of hypoglycaemia, hyponatraemia, altered sensorium and shock which were the presenting manifestation in one-third of our SS patients. Thus, SS must be considered in the differential diagnosis in patients presenting with altered sensorium, shock, hypoglycaemia, or hyponatraemia with previous history of inciting obstetric event.

Anaemia was observed in 43 (93.5%) patients, which was higher in contrast to the study done by Sunil E et al., (41%) and Dokmetas HS et al., (45%) [16,17]. Of the anaemic patients, two-thirds had normocytic normochromic anaemia, which is similar to the pattern seen in patients with corticotroph and thyrotroph deficiency, and complete recovery has been observed after achievement of eucortisolemic and euthyroid state, which is in line with the study done by Laway BA et al., [22].

Amenorrhoea with inappropriately normal gonadotropins in the setting of combined pituitary hormone deficiencies is suggestive of hypogonadotropic hypogonadism, and was present in all our patients, which is in line with findings reported in previous studies [16,17,23]. Diri H et al., described hypogonadotropic hypogonadism in 75-100% SS patients [21]. Lactotroph deficiency was observed in 80.4% patients, which was in line with studies done by Laway BA et al., (90%) and Patto SM et al., (88%) [7,20]. Somatotroph deficiency was observed in 83.3% patients (IGF-1 levels were available in 12 patients). Somatotroph and lactotroph deficiency had been reported in all patients in previous studies [16,17,24].

Total or partial empty sella is a characteristic radiological finding of SS [23]. In this study empty sella was found in 78.3% patients and partial empty sella was found in 21.7% patients, while Sunil E et al., and Laway BA et al., reported empty sella in 83.3% and 100% patients, respectively [16,25]. Dokmetas HS et al., in their study reported empty sella in 75% patients and partial empty sella in 25% patients [17]. The BMD data were available in 11 patients, and all 11 patients had osteopenia, and three patients had a Z score ≤ –2.0, suggesting a possible secondary osteoporosis. These findings are in line with the study done by Sunil E et al., and Gokalp D et al., and the proposed mechanism responsible for osteoporosis was suggested to be gonadotropin deficiency, somatotroph deficiency, and disorders of calcium metabolism [16,26].

Limitation(s)

The present study has limitations inherent to its retrospective observational design. IGF-1 estimation and BMD assessment were not performed in all patients, and dynamic GH testing was not conducted; however, these gaps are unlikely to impact SS diagnosis or management.

CONCLUSION(S)

In conclusion, postpartum amenorrhoea and agalactia were the earliest and most common presenting symptoms of SS. Women with suggestive obstetric history presenting with asthenia, hypoglycaemia, hyponatraemia, altered sensorium, or shock should prompt consideration of SS. Diagnosis was typically delayed by about a decade, with asthenia predominant; most patients also had anaemia and low BMD, adversely affecting health and quality of life.

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